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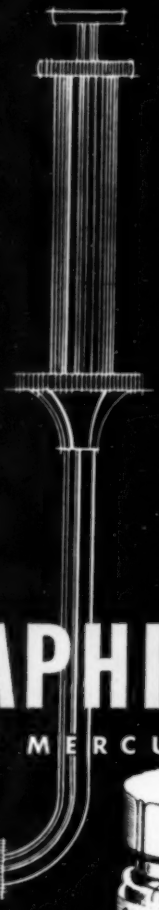

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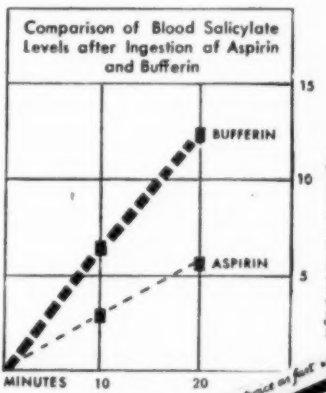

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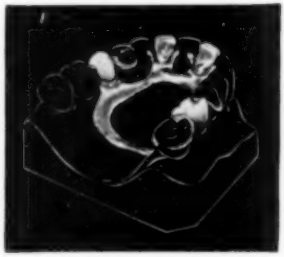

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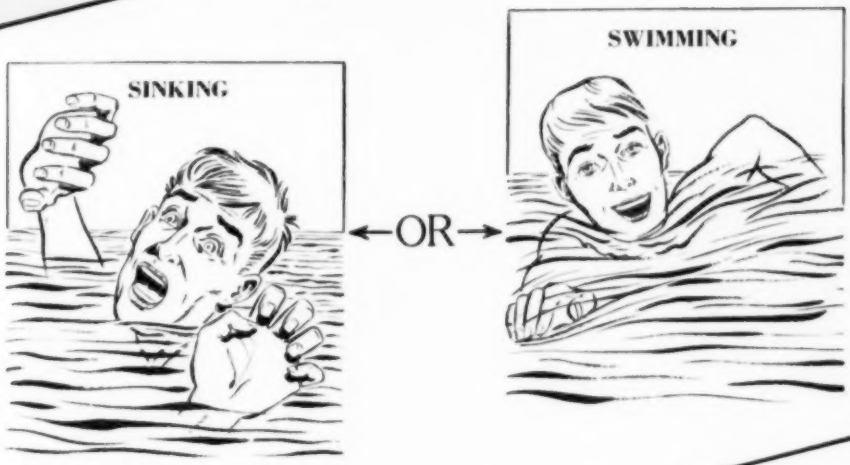

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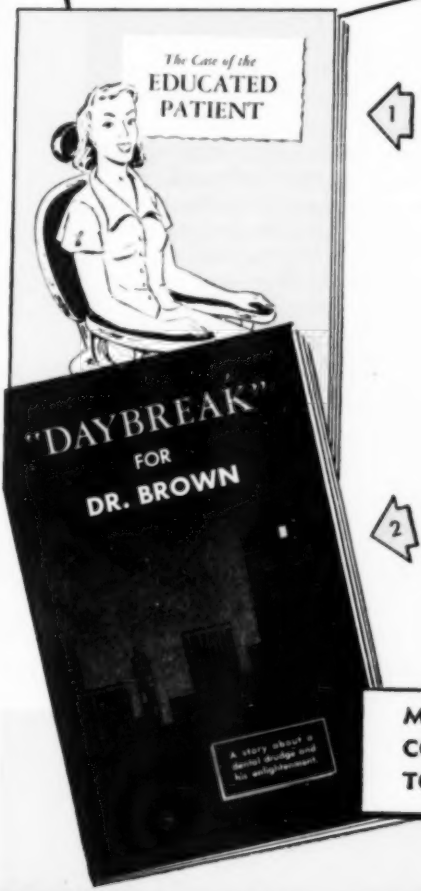

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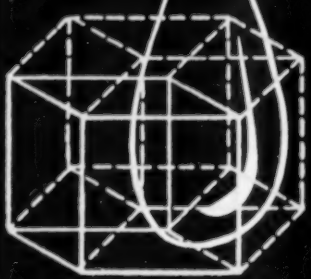

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Hingson, R.A., N.Y. J. Dent., 30:370 (Oct.) 1950.

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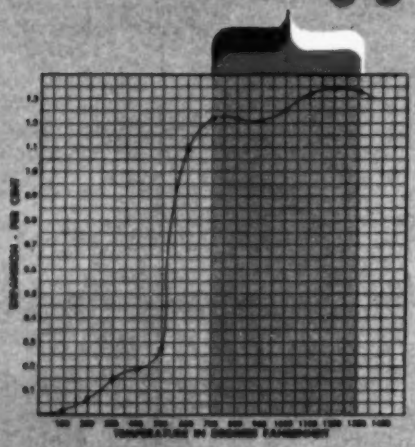

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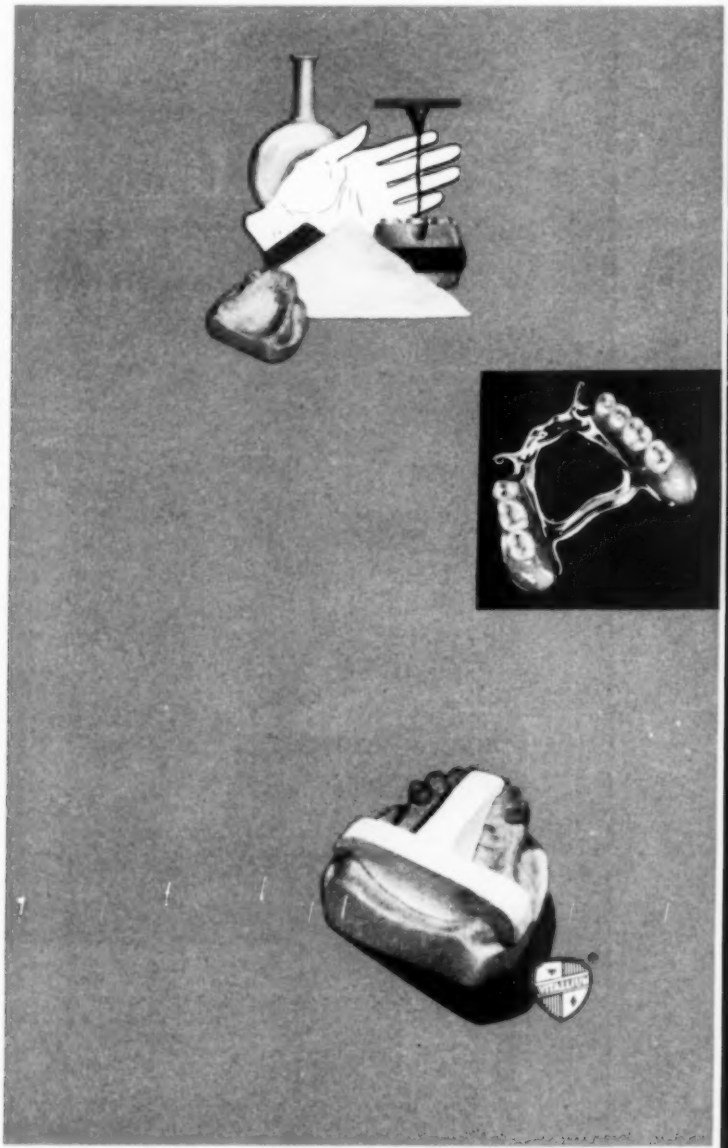

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

VOLUME 46 • NUMBER 4

The physiology of the stomatognathic system

Bernard Jankelson, D.M.D.; George M. Hoffman,† D.M.D., and J. A. Hendron, Jr.,‡ Seattle*

The maintenance or restoration of the normal physiology of the stomatognathic system can best be achieved if procedures are based on a thorough knowledge of normal function.

Because this region is obscured by the overlying soft tissues of the face, investigation has been difficult and incomplete. Furthermore, the problem is one of movement and does not lend itself readily to investigative methods that are essentially static in character, such as anatomic dissection, still roentgenography and checkbites. Yet it is on the necessarily meager information provided by these procedures that presently accepted concepts of stomatognathic physiology are based. Notable exceptions to the use of static methods of inquiry are the work of Hildebrand,[1] of Kurth,[2,3] and of Boswell,[4] all working in the field of jaw movements.

A beginning in the field of cinefluorography for dental investigation was made by Klatsky[5] and by Riesner.[6]

PURPOSE AND SCOPE OF THE INVESTIGATION

The purpose of the investigation was to determine the facts of the physiology of

Prize-winning essay read before the Midwinter Meeting of the Chicago Dental Society, February 11, 1953.

This investigation was done using the facilities of the department of biophysics and physiology, University of Washington School of Medicine, and was supported (in part) by a research grant from the National Heart Institute of the National Institutes of Health, Public Health Service.

*Diplomate, American Board of Prosthodontics; clinical associate and special lecturer in prosthodontics, University of Washington School of Dentistry; director, Seattle Prosthetic Seminar.

†Technical research associate.

‡X-ray engineer, department of biophysics and physiology, University of Washington School of Medicine.

1. Hildebrand, G. Y. Studies in masticatory movement of human lower jaw. Skandinav. Arch. f. Physiol., vol. (suppl.) 1931, p. 3.

2. Kurth, L. E. Mandibular movements in mastication. J.A.D.A. 29:1769 Oct. 1942.

3. Kurth, L. E. Mandibular movements and articulator occlusion. J.A.D.A. 39:37 July 1949.

4. Boswell, J. V. Practical occlusion in relation to complete dentures. J. Pros. Den. 1:307 May 1951.

5. Klatsky, Meyer. A cinefluorographic study of the human masticatory apparatus in function. Am. J. Orthodont. & Oral Surg. 26:664 July 1940.

6. Riesner, S. E. Head and facial pains associated with disturbances of the temporomandibular joints. New York D.J. 13:65 Feb. 1947.

the region. Since investigation of physiology is essentially a problem of dynamics, it was necessary to explore further stomatognathic function with the tools most suited for the investigation of movement.

Although the entire stomatognathic system came into the investigation, this report deals largely with those aspects of function that involve tooth contact or occlusion. Especially explored was the question of the occurrence and the manner of tooth contact during the act of eating and during swallowing.

DESCRIPTION OF EXPERIMENTS

The action of both the natural dentition (varying degrees of wear) and of the artificial dentition (zero degree cusps to 45 degree cusps) were studied. Thirty-five subjects, of both sexes, ranged in age from 11 to 82 years. In order to eliminate the variables that might have occurred through the use of subjects with preconceived ideas, no dentists or dental students were used in the investigations. For the studies of incision, mastication and deglutition, subjects were given food, then requested only to "eat the food," beginning on signal. Incision, mastication and deglutition were studied only as they occurred naturally during the act of eating. Instructions such as "chew it hard"[7] were purposely avoided because they might introduce a conscious effort that would interfere with and alter the performance of a normal physiologic act. For the studies of the "glide"[2,3] (nonmasticatory grinding[8]), the subjects were instructed to slide the mandibular teeth into protrusive and lateral positions while keeping the teeth in contact.[9]

Since it became apparent early in the investigation that, as previously reported,[10,8] the act of eating varied with the character of the food, studies of the various phases of eating were made with three types of food:

1. Highly resistant food: tough steak, fibrous celery.
2. Moderately resistant food: roast beef, short ribs, crisp apple.
3. Soft food: cheese.

Cinefluorographic studies were made during eating and during the "glide" (nonmasticatory grinding) from both posteroanterior and lateral aspects. During the investigation of mastication, the question of the frequency of tooth contact was explored. Cinefluorography alone proved inadequate for the investigation of this aspect of the problem and it was found necessary to further investigate the frequency of tooth contact and the number of chewing strokes by means of other apparatus which will be described later.

Cinefluorographic studies were made of the action of the condyles during incision, mastication and deglutition, and during the "glide." Opacification of soft tissues was found to be unnecessary for study of tongue and palate, as definition proved to be adequate.

MATERIALS AND METHODS

Cinefluorographic Technic • The apparatus used has been described previously.[11] Cinefluorography was done by radiating through the subject with a 500 milliampere rotating anode tube, to a high intensity fluorescent screen. The screen, encased in a light-proof x-ray table, was photographed by a motion picture camera at the rate of 15 frames per second. In order to gain the greatest length of film without exceeding a radiation limit of 20 r, the camera and x-ray circuit were synchronized through a pulsing device to

7. McLean, D. W. Discussion of V. R. Trapozzano's and J. B. Lazarri's Experimental study of the testing of occlusal patterns on the same denture bases. J. Pros. Den. 2:458 July 1952.
8. Shanahan, T. E. J. Personal communication.
9. Hanau, R. L. Articulation defined, analyzed and formulated. J.A.D.A. 13:1694 Dec. 1926.
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11. Rushmer, R. F.; Bark, R. S., and Hendron, J. A. Clinical cinefluorography. Radiology 55:588 Oct. 1950.

turn off the x-ray during the time the film was in motion between frames. With roentgen-ray exposure of 200 milliamperes and 100 kilovolt peak at a 40 inch tube-screen distance, a total of seven seconds running time was acquired. The resulting film (Fig. 1) was seven feet long when made with a 35 mm. camera. To allow lengthy analysis of this comparatively short time of action, the individual strips of film were spliced end-to-end, forming a loop that could be run repeatedly through a projector for any desired time. For the purpose of making a demonstration film, such loops were printed on duplication film to give long repetitive runs of each individual strip.

Simultaneous Occlusal Contact and Vertical Motion Graphing • A subject with "normal" occlusion was chosen. It was also necessary that this subject have opposing posterior metallic full crowns. The subject's occlusion was equilibrated to a fine degree. Stainless steel orthodontic bands were fixed to the crowned teeth in a manner to assure definite electrical contact, and extremely flexible 22 gauge stranded plastic-covered copper wire was soldered to the orthodontic bands and carried forward and out of the mouth. The wires were affixed to the buccal surfaces of the teeth in the respective arches in order to avoid interference with normal mastication. Four millivolts was applied to the crowns through the 22 gauge wires and an EKG amplifier (oscillograph) was placed in series with this circuit. The output of the amplifier drove one pen of a multiple channel direct-writing recorder. When the opposing crowns made contact, the circuit was closed and the four millivolts was amplified and recorded graphically as an abrupt deflection caused by sudden excursion or displacement of the galvanometer, which established the fact of absolute occlusal contact. Thus it was possible to establish the frequency of occlusal contact during mastication (Fig. 2).

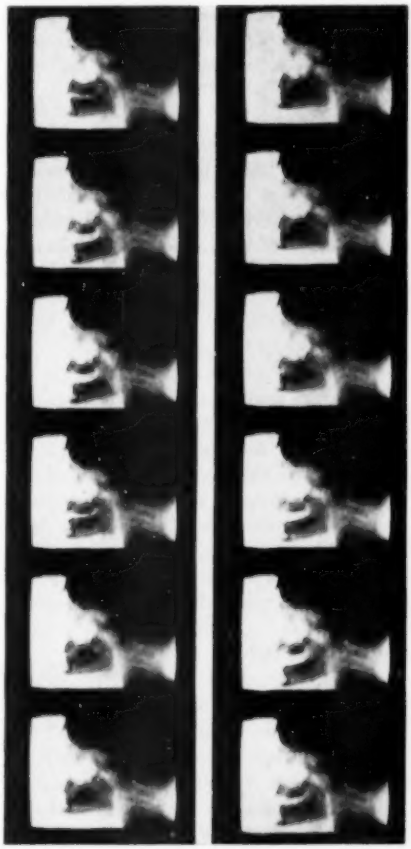


Fig. 1 • Cinefluorographic record of the sequence of events during eating

Method of Recording Vertical Motion Simultaneously with Tooth Contact • An accordion bellows tube was affixed under the gnathion of the mandible and anchored by a strap over the head. The pneumatic pressure within the bellows actuated a strain gauge, the output of which was amplified to drive another channel of the recorder. This assured correlation of vertical motion to occlusal contact (Fig. 2).

The number of subjects analyzed by this method was limited and this is not presented as a complete analysis of the subject.

Report of the Results • Division of the act of eating into incision, mastication and deglutition was purposely avoided during the investigation. This classification is used herewith, however, because of its convenience for purposes of reporting.

INCISION

Incision was investigated by cinefluorography from the lateral and posteroanterior views, and by the stylus graphing originating from the accordion bellows tube and strain gauge, as described earlier. Subjects were requested to "eat the food" so that incision would occur incidentally, as a natural part of the act of eating, and not as a voluntary separate act. A report of performance with each type of food follows.

Highly Resistant Food • The mandible opened, then closed in protrusion, and the food was grasped between the teeth in the protrusive or end-to-end position. When the mandible contacted the food, retrusion of the mandible began, but retrusion stopped when definite resistance was encountered (Fig. 3). Hence incision of extremely tough food often occurred entirely in the end-to-end position. As the mandibular teeth pressed further into the food and muscular tension increased, the movement abruptly changed from an essentially continuous stroke to a movement of rather minute forced oscillations (Fig. 2, 3, 4). Pending further investigation, the true character and significance of this movement must remain in the realm of speculation. All the time that the mandible was cutting into the food and tearing it back toward the centric position, the head and shoulders were rigid or were pulling backward, while the hand and arm twisted the food forward and downward. After the food was torn off with the teeth in the end-to-end position, the mandible dropped, the lips guided the bolus toward the tongue, and the tongue and cheeks placed it between the teeth as the mandible closed to begin mastication.

Moderately Resistant Food • After the mandible had engaged in prehension of the food, movement of the mandible posteriorly toward centric position began. How far toward centric position this movement progressed apparently depended on how rapidly the resistance of the food increased as it was compressed between the teeth (Fig. 2). When moderately resistant food was involved, retrusion was interrupted before the mandible had returned completely to centric position (Fig. 3). Then the short oscillating movements (Fig. 4) began cutting into and thinning the food at that position. The food tore off at the thinned part before the teeth had cut completely through and before contact of teeth occurred. The mandible then opened, the lips guided the bolus toward the tongue, and the lips and the cheek and tongue acted together to place the food between the teeth preparatory to chewing. Participation in the act by the hand and arm, and by the head, neck and shoulders, was evident throughout the act.

Soft Food • The mouth opened, the mandible moved forward and grasped the food in the protrusive position, then sheared into the food moving toward centric position without interruption (Fig. 3). The food was not cut entirely through by the teeth but was parted at the thinned out area.

Discussion of Findings on Incision • It was noteworthy that only with food so soft that the food did not build up pressure as the teeth moved into it, did the act of incision appear as an uninterrupted

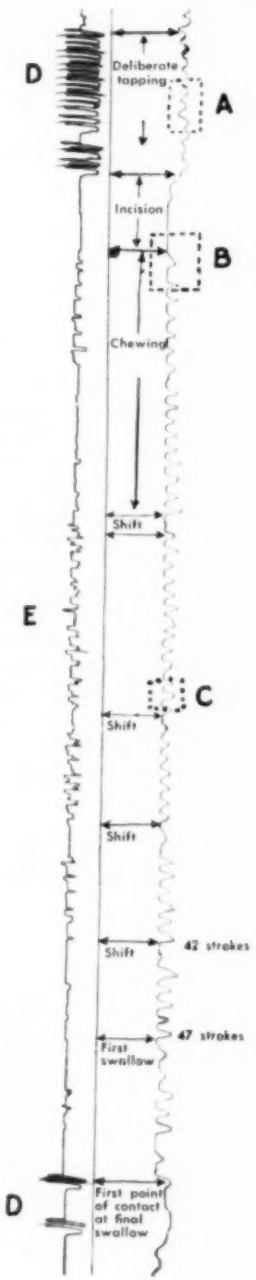


Fig. 2 • Composite graph of vertical motion and tooth contact during eating of crisp apple. A: Strokes during rapid tapping of teeth. B: Incising movement. C: Masticatory cycles. D: Tooth contact deflections. E: Current leakage deflections

shearing or tearing movement toward centric position. The greater the resistance of the food, the sooner progress toward centric position stopped and the relatively continuous stroke changed to the oscillating type. The obvious cutting efficiency of the minute oscillating strokes of this action, and the fact that the action occurred when heavy pressures were necessary to cut into the food, make it likely that they had a cutting function. That they were also a means of control was suggested by the fact that they were equally or more apparent through a much greater range in the incising of a crisp apple, where great pressure was not a factor, but where sudden splitting of the apple necessitated control of movement to avoid sudden heavy shock contact of teeth.

It was plain that incision of food is seldom performed by the teeth alone. The action of the mandibular teeth, grasping the food and tearing and thinning it backwards, was aided by the head and shoulders pulling in the same direction, at the same time as the hand and arm pulled, twisted, and tore the food forward and downward in the opposite direction, until it broke at the portion that had been thinned by the teeth. With resistant, tough fibrous food, the morsel parted where it had become thinner as the teeth cut into it and as the pull of the hand tore and twisted it off while the teeth grasped it between them and held it. With softer foods the movement of the teeth toward centric position contributed a greater proportion of the tearing action. Incision, then, was not a simple act of teeth cutting through food

Fig. 3 • Schematic illustration of incision

until it was severed.[12] Rather, in each subject studied there was evidence of participation in the act by the muscles that drew the head back or braced it rigidly, by the hand and arm that held the food and pulled forward and twisted to tear it off, while the mandible was braced or was moving posteriorly. The food was torn, and parted at the thinned portion, before it had been entirely cut through by the teeth. In no instance was there evidence of balanced contact of the posterior teeth during incision, either in the studies of natural dentition or of carefully balanced artificial dentition. Our observations confirm the saying, "Enter bolus, exit balance."

Incision with Artificial Dentition • Cinefluorographic studies were made of the incision of food by six subjects wearing denture prostheses. The cusp angulation of dentures worn by those in the group varied from 0 degrees to 45 degrees. Stability of the bases ranged from adequate to inadequate.

Those subjects with inadequate bases incised by pushing the food by hand upward and backward against incisors or cuspids, while the tongue was retruded, arched, and braced to support the postdam area of the maxillary dentures. The mandibular teeth followed the progress of the food upward as it was pushed and sheared off against the maxillary incisors by the hand, but they did not act as cutters. Rather they functioned as a mild stabilizer and participated in maneuvering the incised portion after it became separated. Subjects with more adequate denture bases tended to function more nearly like those with natural dentition. Limitations on function imposed by the inadequacy of any individual prosthesis were compensated to a remarkable degree by the adoption of modified methods for incising the food. The extent of modification depended largely on the degree of instability of the denture bases.

Cusp angulation had no apparent influence on the manner of incision since even with 45 degree cusps on dentures set to fine articulator balance, there was no occlusal balance during incision. In no case was there any evidence of occlusal balance during incision as long as the bases remained in place against the tissues. The influence of the tongue as a retaining factor was obvious, however.

The role of denture stabilization during incision, heretofore attributed to occlusal balance, may with much more validity be credited to the supporting action of the tongue arched against the posterior palatal area of the denture.

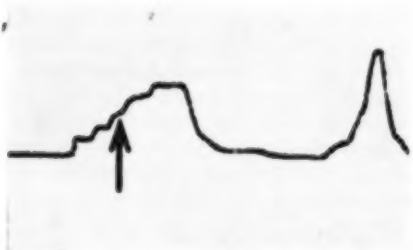


Fig. 4 • Enlarged view of oscillating movement during incision

12. Gysi, Alfred. Masticating efficiency in natural and artificial teeth. D. Digest 21:69 Feb. 1915.

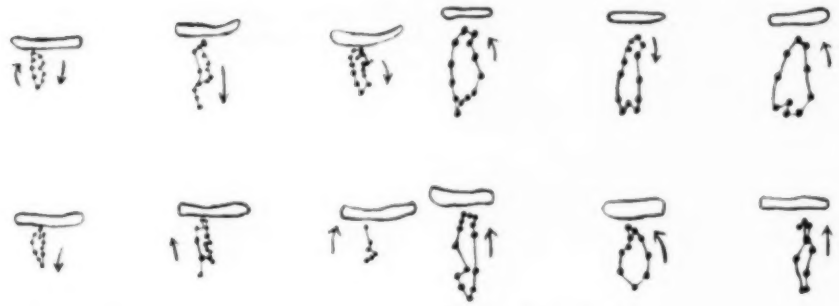


Fig. 5 • Chewing cycles. Dots were traced from consecutive cinefluorographic sequences (posteroanterior aspect). Line between each dot represents 1/15 second of time.

MASTICATION

Mastication was studied by:

1. Critical repetitive observation of projected cinefluorographic film in motion.

2. Projecting, one at a time, the successive frames of cinefluorographic strips, and tracing the path of a lead shot that had been placed between the mandibular central incisors just before taking the film.

3. Composite graphing of vertical motion and occlusal contact as already described.

Findings • Critical repetitive observation of the projected moving cinefluorographic film studies was made as a prelude to the detailed analysis reported later.

The path of travel of the mandible as evidenced by tracings of successive frames of cinefluorographic film strip taken from the posteroanterior aspect is shown in Figure 5. Space between each shot represents a time lapse of 1/15 of a second. This interval is an advantage in evaluating speed of travel during the stroke. It is a disadvantage in following a continuous path of travel, however, and allowance should be made for the error it might introduce, especially in the evaluation of the terminal stroke. Kurth reports that, using stroboscopic photographs,[2] 25 visual images per second were necessary for a clear picture of the direction of the mandibular movement.

Cinefluorography alone proved inadequate for the investigation of certain aspects of mastication. Composite graphing of vertical movement and of tooth contact during mastication, as described in an earlier paragraph, yielded much information. A composite graph of a young woman with full natural dentition eating an apple is shown in Figure 2. Tooth relationship was normal and the occlusion was checked for premature contacts. The subject was asked to tap the teeth lightly together and then to eat the apple. The tapping was for the purpose of ascertaining, as a control, the character of the deflection made by the stylus when tooth contact occurred (Fig. 2, D). The small deflections (Fig. 2, E) conceivably made by leakage of electrical current through the apple and saliva are easily distinguishable from those made by tooth contact. In some strokes, as tooth contact was approached, the

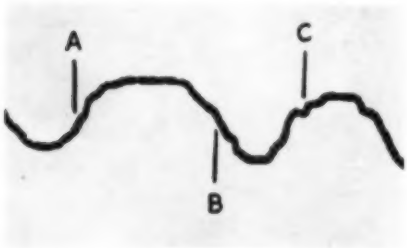


Fig. 6 • Enlarged view of Figure 2, A showing oscillating movement during voluntary tapping of teeth. A: Closing component of masticatory cycle. B: Opening component of masticatory cycle. C: Oscillating movement

graph shows a series of steps (Fig. 6) similar in character to that found during incision (Fig. 4). Occurrence of the oscillating movement during rapid tapping (Fig. 2, A and 6) suggests that it might be part of an involuntary mechanism designed to avoid any shock contact of teeth.

Contrary to the impression that food usually is chewed inadequately in terms of chewing strokes, 54 strokes were made in the chewing of a large bite of apple.

That tooth contact during chewing did not occur, or was insignificant, is evidenced by the absence of a typical tooth-contact deviation on the graph. The characteristic contact deviation (Fig. 2, D), absent during chewing, appeared in some instances at the first swallow, in others only during the second or third swallow. In those instances in which it did not occur during the first swallow, a residual portion of food usually was still between the teeth, even though the main portion which had been manipulated away by the tongue had been swallowed. The residual food was then chewed further for a limited number of strokes and a second swallow occurred. Sometimes food still remained in the mouth, and further chewing and a third swallow was evident.

Discussion of Findings on Mastication • The experimental findings during mastication established the following characteristics of the masticatory cycles ("masticatory cycles" is a descriptive term used by Shanahan[13]).

1. The chewing strokes were not uniform in the closeness of their approach to occlusal contact. The first strokes into a hard resistant bolus terminated far short of occlusal contact; succeeding strokes approached occlusal contact more closely as the bolus was softened and reduced in size.

2. The strokes slowed as they approached occlusal contact.

3. The more or less continuous upward stroke often changed to a controlled oscillating type of movement as tooth contact became imminent. The nature and the significance of the movement is not established.

4. A lateral movement of varying range often was evident at the terminal portion of the stroke. There is insufficient data at the present time on which to base any determination of its nature or function. Whether it is a shearing action as some have assumed[7] or a natural phenomenon of the shift in direction as the opening component of the chewing cycle is approached, or whether it is a combination of both, is not known. Since the lateral movement was equally or more evident in those initial strokes of mastication that stopped far short of tooth contact, the assumption that they represent a shearing movement directed by the inclined planes of the teeth[7] is unwarranted.

5. Even allowing for the 1/15 second time lag indicated in Figure 5, there is a noticeable lack of uniformity of the scope and direction of the terminal lateral movements. The lack of uniformity would

13. Shanahan, T. E. J. Dental physiology for dentures. J. Pros. Den. 2:3 Jan. 1952.

seem to preclude the assumption that this part of the cycle was guided by cuspal inclination.

6. No regular pattern of the chewing stroke was found. Each stroke and each part of the stroke was essentially adaptive to the character of the food being chewed. Furthermore, the character of the food was in a continuous state of change as the mandibular teeth closed into it. The act of chewing was influenced by the constantly changing consistency, shape, and size of the food, by its taste and even by the state of the subject's emotions.[14]

7. The chewing stroke blended into the opening part of the cycle at various levels short of tooth contact. It was apparent that food was between the teeth at all times during chewing, tooth contact being negligible and nonfunctional except as a tactile warning to terminate the stroke.

8. During the opening component of each chewing cycle the cheeks and the tongue maneuvered the bolus into place between the teeth while the mandible dropped into position for the beginning of the next chewing stroke.

Even though it might seem that these findings are incompatible with those of other investigators, they do not detract from the validity of previous reports.[2-4, 7] Important differences in the conditions of the various experiments preclude any likelihood that the investigators were reporting on the same acts. Our report deals with a description of action observed during the uninhibited masticatory function of numerous subjects. Kurth,[2, 3] who has contributed much to this field of investigation, reports on movement made by a subject who

> . . . was first instructed to make free movements of the mandible to the right and left, and to protrude, without using the opening component. . . . Then the patient was told to describe a functional stroke of mastication, the direction of which was determined by the patient's habitual muscular pattern of opening and lateral movement.

Chewing of food was not involved. In justice to this excellent work it must be noted that it was not presented as a study of actual function, but as an illustration of the difference between the stroke and the glide. The findings are valid and well supported. They do not conflict with our findings because they are not descriptive of the same act.

Other findings, which at first glance may seem contradictory to those given here, were recently reported by McLean.[7] He states that the investigation is of a subject chewing Dentyne chewing gum under instruction to "chew it hard." Since the function of chewing is to prepare food for swallowing, the chewing of Dentyne chewing gum is not functional. Furthermore, this substance has few of the characteristics of food while it is being chewed—it does not change volume, its consistency is not affected by the chewing stroke or by ensalivation. The instruction to "chew hard into soft gum" is a directive to the subject to consciously perform the act in a specified way. The findings as reported are valid for the chewing of gum, with specific instruction as to the manner of chewing. Again, they do not conflict with our findings because they are not descriptive of the same acts.

Boswell's[4] concept that the cycles have their termini at centric occlusion is based on findings recorded, during the chewing of various foods, by an ingenious apparatus held in place by an arrangement of straps around the subject's chin and head. The difference in findings could be accounted for by the presence of this device. Boswell's report deals with the performance of subjects wearing this device during chewing; our report deals with the performance of subjects who were not wearing this device during chewing.

14. O'Rourke, J. T. Significance of testing for biting strength. J.A.D.A. 38:627 May 1949.

Again, the findings do not conflict because they are not descriptive of acts performed under the same conditions.

THE "GLIDE" (NONMASTICATORY GRINDING)

Cinefluorographic Findings • Our findings corroborate those of Kurth[2,3] in that we found that the movement of the structures of the stomatognathic system during the "glide" bore no resemblance to the movements occurring during the chewing of food. This observation applies to the action of the teeth, condyles, palate, tongue and hyoid bone. Their relative quiescence in the "glide" compared to the vigorous movements in chewing was especially noticeable. At no time during mastication were we able to detect evidence of the "glide."

DEGLUTITION

Occurrence and Frequency of Occlusal Contact of Teeth • Shown clearly in the oscillograph recording (Fig. 2) is the decisive contact of teeth during deglutition. In the cinefluorographic studies also, closure of the mandible against the maxilla during deglutition was consistently evident. The physiologic necessity for the mandible to be "forcibly anchored in the occlusive position"[15] became apparent when the extremely forceful contractions and thrust of the tongue and suprahyoid muscles were observed. The contraction of these muscles, which have their origin in the mandible, plays a decisive role in the act of deglutition. Stabilization of the mandible against the maxilla allows these muscles to function with the utmost efficiency. No phase of the chewing of food can be accomplished with the teeth in contact because when the teeth are in contact no food is between them.[16] On the other hand, deglutition is performed most efficiently with the teeth in contact, acting as an anchor for the functioning muscles. Shown clearly in Figure 2 is the decisive contact during deglutition, in contrast to the lack of contact during chewing. Indeed, it cannot be stressed too forcefully that it was only during the act of deglutition that functional contact of opposing teeth was demonstrated.

Centric Occlusion During Deglutition • Rushmer[15] reports that

> Efficient deglutition depends on the plasticity and mobility of the tongue. Conformation of the superior lingual surface to the palate forms an air-tight seal which separates the anterior oral cavity from the oropharynx.

This conformation of the tongue to the palate occurred consistently in the cinefluorographic sequences of deglutition. Very consistent, too, was the forceful, piston-like thrust of the tongue as it propelled the bolus into the oropharynx. In short, when swallowing, the scene of action shifted energetically posteriorly toward the pharynx. Forcible retrusion to reach the site of its work, and forcible retrusion to accomplish that work of sealing and of propulsion, characterized tongue action during deglutition. The vigorous retrusion of the tongue (Fig. 7) explains why the mandible was inevitably carried into maximum retrusion during involuntary deglutition whenever the path of closure was free of occlusal interference and clarifies the common observation that in those cases where the mandible is prevented by cuspal interference from attaining centric occlusion, it goes to that position after the interference is removed.

Only during deglutition does tooth contact occur as a functional act. The forceful contractions and propulsive thrusts of muscle groups which have their origin in the mandible necessitate that

15. Rushmer, R. F., and Hendron, J. A. The act of deglutition: a cinefluorographic study. J. Appl. Physiol. 3:622 April 1951.

16. Shaw, D. M. Form and function in teeth, and a rational unifying principle applied to interpretation. Internat. J. Orthodont. 10:703 Nov. 1924.

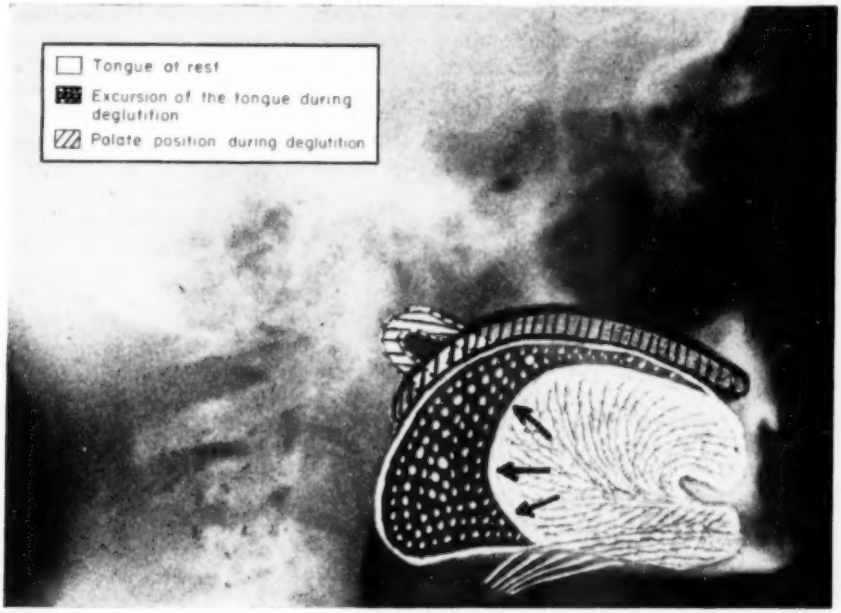


Fig. 7 • Direction and range of movement of tongue during deglutition

the mandible be anchored preferably against the maxilla. Centric occlusion provides this anchorage in the most favorable position for action of the tongue during deglutition. This confirms the almost universal clinical observation of the importance of centric occlusion.

SUMMARY AND CONCLUSION

Cinefluorographic and other investigations led to the following conclusions:

Incision is not a simple act of teeth cutting through food until it is severed. It is a coordinated effort by hand and arm, by teeth, and by head, neck and shoulders. Contact of teeth seldom occurs during the act because the food tears off at the thinned portion before it is cut entirely through. The character of the food being incised greatly influences the nature of the act. The occurrence of minute forced oscillations during incision and mastication is reported for the first time. The nature of these movements and their significance is speculative. Subjects with inadequate denture prostheses compensated for the inadequacy during incision by pushing the food by hand against the maxillary teeth. The mandibular teeth did not participate in the act as cutters. In no case was there any evidence of tooth balance during incision, and tooth balance had no part in the stabilization of the maxillary dentures. The dentures were stabilized by the tongue.

Masticatory cycles are described. The cyclic strokes were adaptive to the food being chewed and exhibited no regular pattern. The findings indicate that food is between the teeth at all times during chewing, tooth contact being negligible and nonfunctional except as a tactile

warning to terminate the stroke. The few light incidental contacts found during chewing seem to be the part of the stroke that "overshot the mark."

The evidence strongly suggests that centric occlusion is the only tooth contact of any significance that occurs during stomatognathic function. Evidence of eccentric tooth balance during eating was not found. There was no evidence that balance of teeth in eccentric positions is a physiologic necessity, or that lack of eccentric balance is less conducive to masticatory function.[17] The voluminous literature on occlusion furnishes little experimental evidence on this question.

17. Burgess, J. K. Discussion of F. W. Frahm's Incisal guidance—its influence in compensation and balance. J.A.D.A. 13:782 June 1926.

Space maintenance for children

Norman H. Olsen, D.D.S., Chicago

The problem of space maintenance for children involves not only a special mechanical skill but also a thorough grounding in the underlying biological principles of changing dentition. A knowledge of growth and development is essential for diagnosis and treatment in cases of premature loss of deciduous dentition. In view of the fact that the function of the deciduous dentition[1] is to provide mastication as well as to maintain the line of occlusion and space for the permanent teeth, it is apparent that any break in natural development may require the dentist's intervention to restore nature's balance.

GROWTH AND DEVELOPMENT

In describing the growth of the facial skeleton, Sicher[2] differentiates the growth of the maxilla from that of the mandible. The maxilla depends on sutural growth for its development, whereas the main growth center of the mandible is in the hyaline cartilage of the condyle. There are four sutures of prime importance in the growth of the maxilla; these sutures are parallel to each other and cause a forward and downward growth of the maxilla.

In the mandibular condyles, there is a proliferation and a replacement of the hyaline cartilage by bone. The new bone contributes to an increase in the overall length of the mandible as well as in the height of the mandibular ramus. The height of the mandibular body is dependent on the apposition of bone on the free alveolar surface.

In cases of anodontia although the

Department of pedodontics, Northwestern University Dental School.

1. Kopel, H. M. The space maintenance problem in the primary dentition. J. Den. Children 17:21 3rd quart. 1950.

2. Weinmann, Joseph P., and Sicher, Harry. Bone and bones: fundamentals of bone biology. St. Louis, C. V. Mosby Co., 1947.

growth of the jaws is not dependent on the teeth, the development and growth of the alveolar process are dependent on the development and eruption of the teeth. If there is an absence of teeth, there is also an absence of the alveolar process. Therefore, the growth and development of the alveolar processes are closely associated with the eruption of the teeth.

Since the deciduous posterior teeth are larger mesiodistally than the bicuspids, usually there is enough room for the bicuspids to erupt if the molars are maintained in the arch until physiological exfoliation occurs. A lateral growth in the anterior region commences at about three years of age and continues through the tenth to the twelfth year. There is twice as much lateral growth[3] in the upper deciduous cuspid region as in the lower cuspid segment. This anterior and lateral development[1] is called the anterior component of force.

In a study at the Merrill Palmer School in Detroit on growth in the width of the deciduous arches, Lewis and Lehman[4] made the following observations of the total mean increase in the various segments of the arch: upper cuspid region—5.26 mm., lower cuspid region—2.40 mm., upper first molar region—3.06 mm., lower first molar region—1.27 mm., upper second molar region—1.90 mm., lower second molar region—2.12 mm. They noted further that there is some lateral growth between the ages of six and ten in the first deciduous molar region and only a slight increase in arch width in the first permanent molar region from seven to eleven years.

From these observations it can be inferred that the premature loss of a deciduous tooth causes a break in the anterior component of force and results in a diminished space for the permanent successor. Sicher[2] and Salzmann[5] state that the premature loss may result also in a lack of development of the alveolar process.

INDICATIONS FOR MAINTAINERS

In determining the need for space maintenance, the practitioner must study the case in its various aspects. All too often insufficient time and care are devoted to making a complete survey of the problems of the specific patient. Besides growth and development, the practitioner should study the occlusion, the condition of the alveolar bone, the hereditary factor and the chronological age of the patient.

It is generally conceded[2-7] that in case of the premature loss of a deciduous incisor the maintenance of space in the upper anterior region is not necessary, since there is a natural lateral development due to the increase in the mesiodistal diameter of the permanent incisors. The only indication for a space maintainer in the upper anterior segment is a need to satisfy esthetic and phonetic requirements. As a general rule, appliances are not used to maintain such spaces unless the child develops a tongue habit or experiences difficulty in phonetics. In such a case it is necessary to maintain the space without inhibiting lateral expansion.

Callaway,[8] on the other hand, declares as his opinion:

> The only positive contraindication to the use of a space maintainer where there is a break in the continuity of the dental arch is death. While the life process continues, there are continual changes and adjustments, particularly during periods of rapid growth. Usually, it is thought that when a deciduous

3. Brauer, J. C., and others: Dentistry for children, ed. 2. Philadelphia, Blakiston Co., 1947, p. 341-360.

4. Lewis, Samuel J., and Lehman, Ira A.: Observations on growth changes of the teeth and dental arches. D. Cosmos 71:480, May 1929.

5. Salzmann, J. A.: Principles of orthodontics. Philadelphia, J. B. Lippincott Co., 1943, p. 141.

6. McBride, W. C.: Juvenile dentistry, ed. 5. Philadelphia, Lea & Febiger, 1952.

7. Hogeboom, F. E.: Practical pedodontia or juvenile operative dentistry and public health dentistry, ed. 4. St. Louis, C. V. Mosby Co., 1938, p. 213, 214.

8. Callaway, George S.: Contraindications for space maintainers in the mouths of children. J.A.D.A. 27:1091, July 1940.

. . . tooth is lost . . . and the succeeding permanent tooth will not erupt within a period of six months, a space maintainer is needed.

At the Institution of Child Welfare,[9] however, a study of 156 preschool children was made by workers from the University of Minnesota. They observed that 94 per cent of the arches developed normally despite the early loss of the first deciduous molar. In case of the loss of the second deciduous molar only 60 per cent showed no ill effects. The workers observed also that the age at which the first deciduous molar was lost appeared to have no bearing on the closure of spaces.

There is considerable variance of opinion as to the results caused by the premature loss of deciduous teeth. McBride[6] says that by a conservative estimate over 50 per cent of all corrective needs of children can be attributed to an early loss of teeth; Brandhorst[10] in 1932 stated that 20 per cent of malocclusions are caused by premature loss of deciduous teeth; Willett[11] in 1933 estimated that 28 per cent of the cases of premature loss of deciduous teeth result in malocclusion.

There is a great variance of opinion also as to the need of a space maintainer in the posterior segments. It is most interesting to note, however, that most of these writers agree that the early loss of a second deciduous molar causes more disturbances than the early loss of a first deciduous molar. In the practice of preventive dentistry, the error in placing a space maintainer unnecessarily is much more excusable than that of neglecting to place one when it is necessary.

THE REQUIREMENTS OF A SPACE MAINTAINER

Kohn[12] lists thus the requirements for a space maintainer:

All appliances (1) must retain original space; (2) must compensate for and move with and in direction of normal facial development and growth; (3) must restore function; (4) should allow the abutment teeth to move in function if possible, but not beyond functional movement, to avoid luxation; (5) should restore the appearance to normal; (6) should aid in phonation; (7) must prevent elongation of the teeth in the opposing jaw; (8) should be easily cleaned; (9) should be constructed so that they can be removed easily for periodic inspection and for alteration . . .; (10) should be constructed without the cutting of any surface of the abutment teeth.

For practical purposes these requirements[3] may be limited to four: (1) maintain sufficient space to allow for the eruption of permanent successors, (2) not interfere with the growth and development of teeth and alveolar arches, (3) prevent extrusion of teeth into the opposite arch, (4) restore function. If these requirements are satisfied, the maintainer, in nearly all instances, will approximate the ideal.

TYPES OF MAINTAINERS

Space maintainers can be classified as functional, semifunctional and nonfunctional. They may be either of a fixed or of a removable type.

A functional space maintainer is one that employs a pontic to restore function and to maintain space. A well-known example of this type of maintainer is the Willett overlay soldered to a cast gold pontic. The semifunctional appliance utilizes a bar soldered or cast to the overlay on the abutment tooth. The bar which prevents the space from closing is in occlusion with the opposing dentition to prevent ectopic eruption into the space caused by the loss of the deciduous tooth. The bar has a semifunctional role in

9. DeWitt, T. G. Space maintainers. Bur 43:117 Dec. 1943.

10. Brandhorst, O. W. Promoting normal development by maintaining the function of the deciduous teeth. J.A.D.A. 19:1196 July 1932.

11. Willett, R. C. Premature loss of deciduous teeth. Angle Orthodont. 3:106 April 1933.

12. Kohn, Leonard. Space retention with fixed compensating bridges. J.A.D.A. 27:1086 July 1940.

mastication. The nonfunctional maintainer employs a crib which is soldered to the overlay or to a band.

The space maintainer of the fixed type is constructed so that it cannot be removed by the patient. It is either an all-cast appliance or one which employs bands cemented to the teeth after the bar or crib has been soldered. The maintainer of the removable type is constructed of acrylic resin and can be taken out of the mouth by the patient.

The type of space maintainer to be constructed depends on the number and position of the teeth lost and on the occlusion of the child. To be taken into consideration in the making of a removable appliance is the fact that the retention of the appliance[13] depends on the amount of soft tissue that is covered and on the extension of the acrylic resin into the interseptal spaces. It is necessary to use teeth on these appliances only for esthetic purposes; a solid block of acrylic resin in occlusion with the opposing dentition is adequate for space maintenance.

Workers at the University of Minnesota[9] state a preference for the fixed appliance. Many practitioners contend that a child may not have attained sufficient mental development to realize the necessity of wearing a removable appliance continuously. Another disadvantage of the removable space maintainer is that it does not adapt itself to the growing alveolar process.

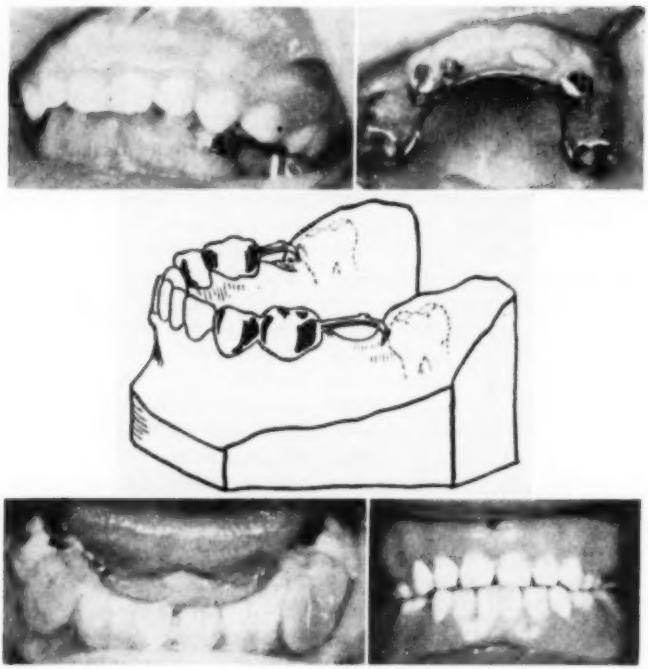
CONSTRUCTION OF TYPICAL SPACE MAINTAINERS

For a space maintainer with a Willett overlay, the only preparation of the tooth that is necessary is to remove the gross undercuts in the abutment tooth. The overlay is constructed as follows: An impression is taken of the abutment tooth with red stick compound. After this impression has been thoroughly dried, low-fusing green stick compound is added to the impression. When the impression material is tempered, it is reseated; and an accurate impression of the tooth is obtained. A die, to which the overlay is to be waxed, is then poured in Grey's investment. The die is scribed around the gingival portion at such a level that the overlay will extend below the free gingiva. Next 28 gauge or 30 gauge casting wax is adapted to the die. The adaptation of the wax is greatly facilitated by having the die warm and by using an Artgum eraser. An extra thickness of wax is added in the gingival area to facilitate a smoother casting of the overlay. The cusp tips need not be covered with wax; therefore this portion of the wax is removed from the die. After the overlay has been cast and adapted to the occlusion, the next step is the construction of the appliance.

Semifunctional, Bar Type Appliance • (See illustration, above left.) An impression is taken of the segment of the mouth involved with the overlay in position; a second impression is taken of the occluding arch. The first impression is poured in soldering investment; the impression of the occluding arch is poured in stone or plaster. Next the casts are mounted on a crown and bridge articulator. A 14 gauge round wire is cut so that it will maintain the space; it is placed so that it lies in the central groove of the opposing arch. When the wire has been properly adapted, it is soldered with low-fusing solder. The appliance is now ready for cementation.

Functional, Pontic Type Maintainer • The functional, pontic type of space maintainer is generally all-cast. When the impression of the abutment tooth is taken for the making of the overlay, the entire segment is included in the impression. An impression of the occluding arch also

13. Gerlach, Elsie: Space maintainers. Illinois D.J. 14:420 Oct.-Nov. 1945.



Above left: Semifunctional, bar type appliance with overlays on the lower left deciduous cuspid and second deciduous molar. Above right: Removable lingual arch wire maintainer used to prevent mesial movement of first permanent molars. Center: Cantilever type appliance to maintain space to be occupied by unerupted tooth. Below left: Lower partial denture maintaining space created by early loss of the four lower deciduous molars. Below right: Full denture used for case of complete anodontia of deciduous teeth

is taken and is poured in stone or plaster. The overlay is then waxed to the die. Next the pontic is carved in wax and luted to the overlay. After a sufficient number of sprues have been attached, the pontic and overlay are invested and cast in one piece. When the maintainer has been adjusted to occlusion and polished, it is ready for use.

Lingual Arch Appliance • (See illustration, above right.) Bands for the anchor teeth are made either by direct or indirect methods and soldered on their mesiobuccal aspect. Next an impression is taken of the entire arch with the bands in place. An 18 gauge wire is now bent to follow the lingual contour of the arch, closely approximating the teeth in the region of their gingival attachment. This wire bar is now soldered in its proper relation to the teeth and gingiva. Next, 20 gauge wires are soldered to the bar as stops to prevent mesial movement of the appliance. Instead of anchor bands soldered to the lingual bar, locks may

be placed on the anchor teeth which will permit removal of the appliance by the dentist.

Cantilever Type Appliance • (See illustration, center.) The cantilever type of appliance is employed to maintain space for unerupted first permanent molars and bicuspids. This particular type of maintainer is similar to the semifunctional, bar type, mentioned previously. After the overlay has been ground into occlusion, a roentgenogram is taken of the segment involved with the overlay in place. The proper measurement of the bar must be determined with the aid of a roentgenogram. The 14 gauge wire need engage only the mesial marginal ridge to prevent mesial movement of the unerupted tooth. After the bar has been soldered to the overlay and the appliance is ready for use, another roentgenogram is taken before cementation to make certain that the shoe or distal extension is in the proper position.

Appliance for Missing Anterior Teeth • Because of the lateral growth of the anterior segment of the arch, a fixed maintainer should not be placed until the jaws have reached their full growth.

A simple type of appliance[7, 14] for a missing central or lateral incisor is an acrylic plate to supply the missing tooth. The plate need not cover the entire vault but only an area within half an inch next to the involved teeth. Retention of the appliance is obtained by adapting wax into the embrasures of the upper dentition. An acrylic tooth of the proper form, size and shade is selected and luted to the wax. After the appliance has been flasked and processed in the usual manner, it is ready for use.

A second type of appliance for the anterior segment employs a bar and tube to permit normal lateral growth. Either bands or overlays may be used on the abutment teeth. First, an impression is taken of the segment involved with the bands or overlays in place. At the same time an impression of the occluding arch is poured in hydrocal while the segment supplying the missing teeth is poured in soldering investment. An 18 gauge wire, cut and adjusted to span the space, is soldered to one of the abutment teeth; and the tube in which the bar fits is soldered to the other abutment tooth. Stainless steel backings of the pontics are then soldered to the bar spanning the space. This type of an appliance permits normal lateral growth and meets esthetic requirements.

Partial Denture • (See illustration, below left.) A partial denture is often employed to maintain space when deciduous molars have been lost in both quadrants. First, an alginate impression is taken of the arch involved and another of the occluding arch. After both impressions have been poured in stone, they are mounted on a crown and bridge articulator. The partial denture is waxed up with base plate wax; the wax is adapted into the embrasures of the remaining teeth and down to the mucobuccal fold to provide maximum retention. Substitutes for teeth may be omitted from the partial denture, or the wax block may have facets carved in it in order to increase masticatory efficiency. To give added strength to these acrylic partial dentures, two 18 gauge wires may be imbedded in the acrylic resin.

Full Denture Prosthesis • (See illustration, below right.) In cases of complete anodontia either of permanent or of deciduous teeth, a full denture is indicated. Denture teeth designed to replace deciduous teeth are now available for prosthetic work of this nature. A denture for a child is constructed in the same way as one for an adult. It is amazing how quickly a child is able to adjust him-

14. Futterman, M. J. The anterior space maintainer. D. Outlook 26:165 April 1939.

self to wearing a denture. The denture must be checked frequently to see that it is not hindering normal growth and development of the arch. It will be necessary periodically to construct new dentures.

SUMMARY

The following are points of particular importance in this paper:

A knowledge of the growth and development of the alveolar arch and dentition is of prime importance in making a complete diagnosis of a case.

More time should be spent in diagnosing cases to determine need for space maintainers. The dentist should employ all diagnostic aids at his command, such as the age of the patient, hereditary factors, roentgenograms and study models.

An appliance to retain space must possess the following requisites: (1) retains original space, (2) does not interfere with growth and developmental processes of the teeth and alveolar arches, (3) prevents extrusion of teeth into the opposite arch, (4) restores function.

With regard to the indications for space maintenance appliances, the following conclusions have been reached: (1) Such appliances need not be constructed in the upper anterior segment except for esthetic and phonetic requirements. (2) They are indicated in the lower anterior segment to prevent a collapse of the lower arch. (3) In the posterior segment, they are indicated more in the second deciduous molar region than in the first deciduous molar area. As a general rule a maintainer is indicated if a posterior deciduous tooth has been lost more than a year prematurely.

The problem of space maintenance is not only a mechanical problem but one which requires a thorough understanding and appreciation of biological principles.

Correct Linguistic Specifications • We do not think of the designing of a radio station or a power plant as a linguistic process, but it is one nonetheless. The necessary mathematics is a linguistic apparatus, and without its correct specification of essential patterning the assembled gadgets would be out of proportion and adjustment, and would remain inert. ***Benjamin Lee Whorf.***

The use of alginate for indirect restorations

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Since the introduction of the reversible hydrocolloid technic for indirect procedures by Sears in 1937,[1] its use has increased steadily. Carefully handled, this material makes it possible for the dentist to secure with one impression routinely accurate reproductions of multiple cavity preparations, to reproduce undercuts without rupture or distortion and to save chair time.

Many variables involved in the use of this material must be controlled by the dentist if the technic is to be successful. One of the most important factors is correct temperature control during liquefaction, storage and tempering of the hydrocolloid. Failure to maintain proper temperatures may result not only in faulty impressions but even in serious tissue injury. For ease in handling the material and holding it at the required temperatures, a unit with water baths that can be held at specific temperatures and specially constructed syringes and trays are essential. Once the dentist is fortified with this equipment, the technic is not unduly complicated or time-consuming. Because of the original cost of such specialized items and a general lack of qualified laboratory technicians, however, many dentists prefer to continue using the older materials, such as compound and plaster, or to develop other elastic impression materials that do not require additional equipment. One of the recent trends has been the adoption of irreversible hydrocolloids for indirect procedures. It is with their use that this paper is concerned.

A brief review of the composition and setting reaction of irreversible hydrocolloids is essential. It is only by a thorough knowledge of their basic properties that one can appreciate the importance of the various steps involved in their use.

Hydrocolloids can be classified into two general types: reversible and irreversible.[2] Both of these are suspensions of aggregates of molecules in the dispensing medium (water). Gelation of the reversible hydrocolloids is primarily a physical change in which a latticework of fibrils forms as the temperature is lowered. This gel can be broken down readily and liquefied merely by heating the material—thus, the term "reversible." Gelatin is an excellent example of a reversible hydrocolloid. Fortunately, agar, which comes from a seaweed, is a material that can be liquefied at temperatures compatible with the oral tissues

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1. Sears, A. W. Hydrocolloid impression technique for inlays and fixed bridges. D. Digest 43:230 (May) 1937.

2. Skinner, E. W. Science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 52.

and then solidified to its elastic gel form at temperatures slightly above 100°F. Agar is the base for all dental reversible hydrocolloids; these materials are usually referred to in dentistry by the one word hydrocolloids.

The irreversible hydrocolloids, on the other hand, are not thermally reversible; their gelation is induced not by physical means but by a chemical reaction. When the reversible hydrocolloids were removed from the market during World War II, an intensive search was made to perfect irreversible hydrocolloids for dental purposes.[3] During the first years of their use they were inferior products and greatly abused. The full potentialities of the material were realized only after much research relative to their chemical and physical properties. The dental irreversible hydrocolloids, commonly called alginates, are basically sodium alginate. During the setting reaction, a latticework of fibrils of insoluble calcium alginate is formed. The set impression is not, of course, thermally reversible as are the agar-base materials. The alginates were at first used extensively as impression materials in prosthetic dentistry and in orthodontics; only recently they have been adopted for the indirect inlay procedure. Numerous studies have been made in regard to the factors influencing the accuracy of the alginates and the various technics advocated for their use in the indirect procedures.[4-14]

It is difficult to compare objectively the merits of reversible and irreversible hydrocolloid for the fabrication of indirect restorations. A practitioner should familiarize himself with both procedures in order to determine which technic will serve his particular practice the best and which will work most efficiently in his hands. Several points can be enumerated as sound arguments for either material. The alginates require little special equipment while the reversible hydrocolloids necessitate the purchase of conditioners, trays and other items if maximum efficiency is to be obtained. Since many of the variables associated with reversible hydrocolloids are mechanically controlled, there is somewhat less chance for human error with their use. In individual batches of the alginates, there is no doubt that more variations exist than with the better commercial hydrocolloids. This particular situation has improved and will continue to improve with time. When both materials are handled properly, an edge of superiority must be granted to reversible hydrocolloid, particularly as an impression material for multiple restorations and long-span bridge abutments. It is not, however, the purpose of this paper to argue the relative merits of either technic but rather to present a scientifically sound and standardized alginate procedure for those who are employing this material. Both technics are unexcelled when used properly; but their success, particularly that of the alginates, is dependent on many variables.

3. Messerman, Theodore. Evaluation of the alginate impression materials in dentistry. J. Ontario D. A. 20:451 (Oct.) 1945.

4. Schoonover, I. C., and Dickson, George. Preparation and characteristics of elastic dental impression compounds with an alginate base. J.A.D.A. 30:565 (April) 1943.

5. Jordan, L. G. Alginate impression materials. J.A.D.A. 32:985 (Aug.) 1945.

6. Skinner, E. W., and Pomes, C. E. Dimensional stability of alginate impression materials. J.A.D.A. 33:1253 (Oct.) 1946.

7. Skinner, E. W., and Pomes, C. E. Alginate impression materials: technic for manipulation and criteria for selection. J.A.D.A. 35:245 (Aug. 15) 1947.

8. Skinner, E. W.; Cooper, E. N., and Beck, F. E. Reversible and irreversible hydrocolloid impression materials. J.A.D.A. 40:196 (Feb.) 1950.

9. Cresson, James. Suggested revisions for testing dental elastic impression materials. J. D. Res. 28:573 (Dec.) 1949.

10. Wilson, W. E. Indirect bridge impression technique. D. Digest 55:60 (Feb.) 1949.

11. Pfeiffer, K. R., and Jeffreys, F. E. Complete bridge technic utilizing the alginate hydrocolloids. J.A.D.A. 40:66 (Jan.) 1950.

12. Schwartz, J. R. Use of hydrocolloids or alginates as impression materials for indirect or indirect-direct inlay construction procedure. D. Items Interest 73:269 (March) 1951.

13. Levy, Clement. Notes and suggestions on the construction and fitting of acrylic crowns. D. Record 65:1 (Jan.) 1945.

14. Hampson, E. L. Use of irreversible hydrocolloids in conservative dentistry. Brit. D. J. 89:171 (Oct.) 1950.

PROCEDURE

The following five representative commercial alginates were used in this study: Coeloid, D-P powder, Zelex, Getz and Kalginate. All were purchased on the open market. The main purpose of the research was to investigate the effect of certain variables on the accuracy of alginates when used for indirect restorations rather than to point out the advantages of any particular brand. Such comparisons are often invalid because of individual variations in different batches of materials and constant changes that are always being made in composition. Some of the products show more variation from batch to batch than others.

One phase of the research in this investigation was the scientific measurement of dimensional changes of the alginate in a typical dental impression tray. These changes were compared with changes observable in practical dies poured in impressions taken of critical cavity preparations. Complete details of the procedures can be found in a previous publication concerned with reversible hydrocolloid.[15] Photographs used in this paper are representative of results obtained on over 2,000 individual dies.

In making the stone dies, one stone (Duroc[16]) was used throughout. In order to standardize the setting expansion of the stone, the powder was weighed, and the water was measured with a pipet. The stone was mixed for exactly one minute and mechanically vibrated into the impression. During the setting of the stone, the impression was placed in a humidifier at 100 per cent humidity for a minimum period of 30 minutes. After separation, the dies were allowed to harden for at least 24 hours before the casting was tried on. All dies were studied under a binocular microscope (15×) for any discrepancies.

The proper armamentarium necessary for the alginate technic can be seen in Figure 1. This includes the proper proportions of powder and ice water, clean mixing bowl and spatula, perforated tray, syringe and watch. Some operators prefer a plastic bowl and spatula for mixing the alginate; a creamy consistency may be obtained with a stiff rubber bowl and spatula. The metal syringe[17] shown here, made specifically for this technic, is much superior to the glass Luer syringes previously employed. This particular syringe is easily loaded and readily cleaned. A Coe impression tray, comparable in design to other common trays, was used throughout this study in order to standardize the procedure.

HANDLING THE MATERIAL

When alginate is used for an indirect restoration, it is necessary to retard the setting time in order to provide the operator with the necessary additional working time and to allow the assistant ample time to flush and clean the syringe. This extension of time is accomplished by the use of ice water instead of 70°F. water, generally recommended. In warm weather it is desirable to chill the mixing bowl, spatula and syringe. To thin the mixture sufficiently for ejecting easily and evenly from the needle, the water-powder ratio is increased. For example, with D-P powder the ratio is 56 cc. per package rather than 50 cc. The use of ice water and a definite water-powder ratio standardizes the procedure and assures a constant setting time.

The proper amount of powder is added to the ice water, which has been placed in the chilled bowl. Mixing is performed vigorously, approximately 200 revolutions per minute, and should be completed at the end of one minute for all the alginates listed previously. In-

15. Phillips, R. W., and Ito, B. Y. Factors influencing the accuracy of reversible hydrocolloid impressions. J.A.D.A. 43:1 (July) 1951.

16. Manufactured by Ransom & Randolph Company.

17. Made by Hatch Company.

sufficient mixing produces a grainy consistency while prolonged mixing breaks up the formation of the latticework of fibrils and lowers the strength of the material.[7] When properly handled, the mix is creamy and free from bubbles and provides ample working time. The needle is now unscrewed from the syringe, the plunger pushed all the way in and inserted into the alginate (Fig. 2). The material is drawn up into the barrel by pulling the plunger out. To avoid air bubbles during the loading of the syringe, the end of the barrel should be kept amply covered with material and the plunger should be withdrawn gradually and slowly. After the syringe is loaded, the needle is replaced and is ready for use. While the operator is injecting the material into the cavity preparation, an assistant loads the tray from the remaining alginate. The sectional trays have been adjusted to the mouth previously by the use of equalizing wax. Wax is flame-softened and molded into each end of the tray to form a dam or stop. The tray is taken to the mouth and seated in such a manner that the prepared teeth are well centered within the tray. After the wax has hardened, the tray is removed. The teeth adjacent to the preparations will have made indentations in the wax, and these indentations act as a guide for positioning the loaded tray correctly.

TAKING THE IMPRESSION

In the ejection of the material, the preparation should be filled first at the gingival portion in order to force out any retained air and to prevent bubble formation. It is generally advisable to work from the distal side toward the mesial side and to cover the entire tooth. The filled impression tray is then carried to place in the predetermined position and held under steady pressure so that

Fig. 1 (Below) • Armamentarium for proper use of alginate in indirect procedure

Fig. 2 (Above) • Filling syringe; ice water slows setting reaction to give ample working time

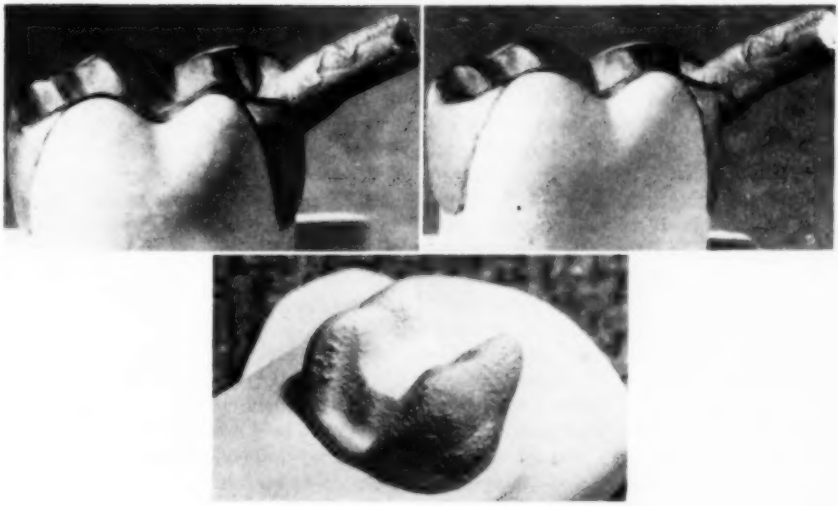

Fig. 3 • Above left: Fit of master control casting on stone die poured in impression allowed to remain on model three minutes longer than required; inaccuracy indicates necessity of removing impression from mouth at proper time. Above right: Stone die poured in impression removed from model two minutes after gelation. Below: Chalky surface caused by not employing recommended fixing solution

no distortion results. Any movement of the tray results in permanent deformation of the impression. During this interval the assistant cleans the syringe by pouring water into the barrel and forcing it out through the needle with the syringe plunger.

REMOVING THE IMPRESSION

Previous research has pointed out the necessity of holding the tray in the mouth for at least two minutes after gelation.[6] Removal before gelation is completed increases the danger of rupture or distortion on removal. With a standardized technic it is possible to set an interval timer at the start of the mix and to remove the impression when the timer has signaled the expiration of the prescribed allotted time. The total time varies for each brand; for example, six minutes for Coeloid and eight minutes for D-P powder.

Since time is a critical factor in the entire operation, it is advantageous to use a clock or interval timer throughout the alginate procedure. With a material such as Coeloid, for example, the material must be spatulated exactly one minute, the tray and syringe loaded and the prepared teeth filled within two minutes and the material allowed to gel for approximately three minutes before removal. Although various writers had cautioned against premature removal from the mouth, none had indicated the possible danger of allowing the material to gel too long before removal. Therefore, studies were made relative to this problem. Figure 3, above left, shows the fit of the master control casting to a stone die which was poured in an alginate impression taken of a large MOD preparation on a

porcelain tooth. This particular preparation is one of a group of different types used in this research; the result shown here is representative of results obtained. The method of study used here is identical with that employed by James[19] and Phillips and Ito.[15] The casting shown was fabricated on the original porcelain tooth, and under 15× magnification had no visible inaccuracies. Consequently, any misfit of this casting to a stone die indicates that the die was not an exact reproduction of the porcelain preparation. The alginate used for this example was handled properly throughout except that the impression was allowed to remain on the tooth nine minutes from the time the mix was started. During this period the tooth and impression were maintained at 99°F. to simulate oral conditions. Since the alginate used was Coeloid, the time was three minutes longer than required. The distortion is obvious when the die is compared with the die shown in Figure 3, above right, the impression of which was removed at the end of six minutes. Other materials behaved similarly. It is apparent that when the impression is held in the mouth too long, a certain amount of distortion results, probably due to some loss of elasticity in the material. It is important, therefore, that the dentist remove the impression from the mouth at exactly the right time; a clock or interval timer is a definite aid.

The force used in the removal of the impression should be exerted with a quick snap and in a direction parallel with the long axis of the tooth. Research has shown clearly that removal of either reversible or irreversible hydrocolloid impressions with a slow rocking motion enhances the possibility of rupture and distortion.[15, 19, 20, 21]

Whenever the manufacturer specifies a fixing solution, it should be employed. Failure to use it results in a chalky surface and increases the susceptibility to distortion. If no fixer is recommended, the impression may be poured at once. In the lower illustration of Figure 3 can be seen the surface of a stone die poured into an alginate impression for which the fixer was recommended but not employed. This is a typical example and is not related to the particular stone used. A 10 to 15 minute fixing time is ample although some of the more recent fixing agents require only two minutes.

STORAGE OF IMPRESSION

Previous studies have demonstrated the importance of pouring the impression as soon as possible after its removal from the mouth.[6, 8] The measurements conducted in those investigations, however, were made on solid triangular specimens poured into a metal trough. In order to determine what actually happens in a typical dental impression tray, it was felt that much of this work could well be repeated employing the technic described in the earlier paper.[15] A Gaertner micrometer slide comparator microscope was used. By means of a traveling objective and an eyepiece moving along a scale calibrated to 0.001 mm., accurate measurements can be made on a small specimen: the microscope is focused on a small marker on one side of the impression, a reading is taken; then rapidly but smoothly the objective is moved along the carriage to focus on a marker on the other side of the impression. The difference in the two readings serves as

18. James, A. G. Maintenance of equilibrium in reversible hydrocolloid impressions. I. Made with stock impression materials. J. D. Res. 28:108 (April) 1949. II. Made with materials supplied by the manufacturers for testing. J. D. Res. 28:119 (April) 1949. III. A report on tests made with five stock impression materials. J. D. Res. 28:447 (Oct.) 1949.

19. Paffenbarger, G. C. Hydrocolloidal impression materials: physical properties and a specification. J.A.D.A. 27:373 (March) 1940.

20. Bignell, K. A. Hydrocolloid technic: its use in inlay and crown and bridge work. Illinois D. J. 18:163 (May) 1949.

21. Thompson, M. J. Hydrocolloid—its treatment and application in securing consistent accurate models for indirect inlays and fixed bridges. Bul. Oklahoma D. A. 38:7 (Oct.) 1949.

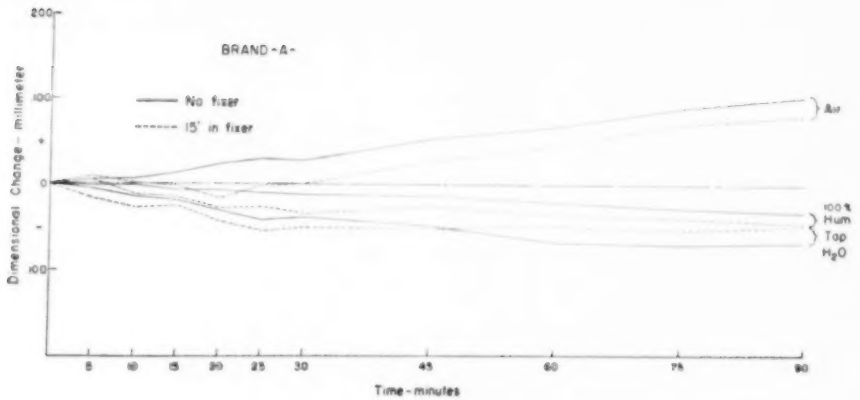

Fig. 4 • Dimensional change of alginate A stored 90 minutes in three different media; data include measurements with and without fixing solution

the length of the measured area, and any subsequent change in the impression can be detected accurately. A specially constructed pan which held the impression tray permitted the measurement of any change in the material while it was being stored in various media. The markers were placed in position immediately after insertion of the porcelain die. A die of the same size as that described in the previous publication was employed. This mold was removed at the time prescribed for the particular alginate, and the fiducial reading was taken immediately. In each test care was taken to place the markers at exactly the same distance from the edge of the die.

The dimensional changes occurring in four different alginates during the first 90 minutes can be seen in Figures 4, 5,

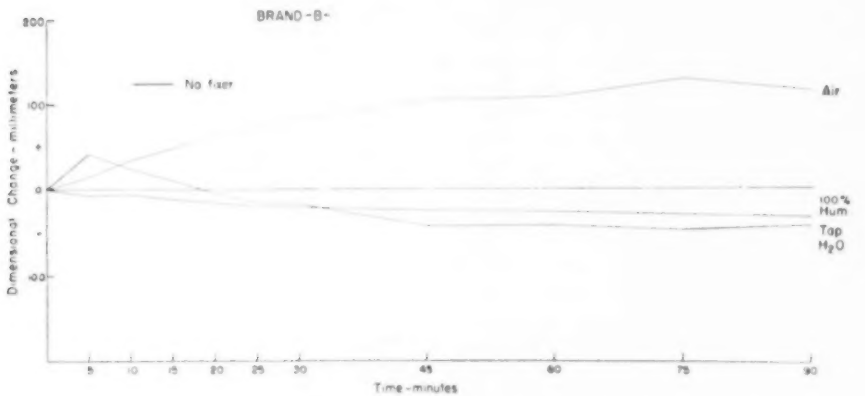

Fig. 5 • Dimensional change of alginate B; this brand does not require fixing solution

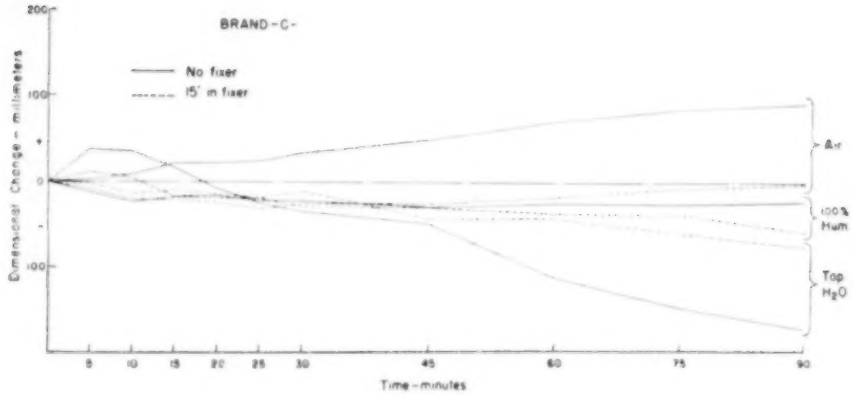

Fig. 6 • Dimensional change of alginate C stored in different media

6 and 7. The curves represent the averages from a minimum of eight individual specimens. Readings were taken every five minutes up to 30 minutes, after which time measurements were made every 15 minutes. Three different storage media were employed: air (the relative humidity of the laboratory when specimens were stored in air ranged from 40 to 65 per cent), tap water and an atmosphere of approximately 100 per cent humidity. These media are representative of the environments commonly employed in the dental office for storage

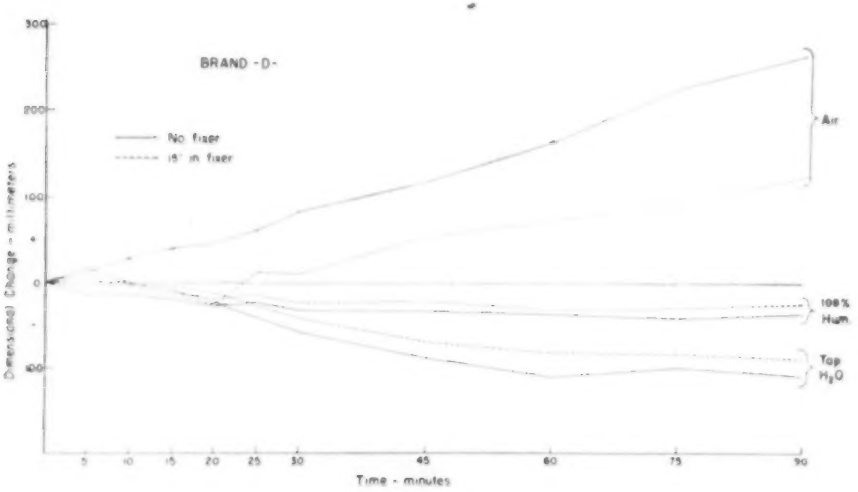

Fig. 7 • Dimensional change of alginate D stored in different media

of impressions before the stone dies are poured. For alginates A, C and D, the dimensional changes were measured also after 15 minutes' immersion in the fixing solution supplied by the manufacturer; the fiducial readings were taken at the same time both with and without the fixer. All results, expressed in millimeters, show the actual dimensional changes across the mold. Expansion on the graph means that the mold itself was larger through contraction of the material between the mold and the tray, while contraction indicates that the mold was smaller through expansion of the material between the mold and the tray.

An analysis of these data based on the measurement of changes in the impression tray substantiates the observations of others that there is no safe storage medium.[6, 7, 8] Since the impression contains approximately 75 to 85 per cent water, it tends to lose water (syneresis) when exposed to air and to pick up additional moisture if immersed in water (imbibition). This fluctuation is accompanied by a corresponding contraction or expansion of the material and deformation of the impression. All the alginates tested showed the greatest change when allowed to remain in air. Likewise, storage in water generally produced a large dimensional change. The least change occurred in an atmosphere of 100 per cent humidity. This observation tion is similar to that of Skinner, who, using long specimens, found that the smallest change occurred in an atmosphere of 100 per cent humidity.[6] It is interesting to note that the use of the fixing solution tends to stabilize the impression in any storage medium. This observation was made previously by Skinner when solid test specimens were employed.[6] This effect was especially noticeable with Brand C. When a fixer was not used, the mold changed an average of 0.090 mm. after 90 minutes' storage in air; but when a fixer was used, the net change was approximately zero. It should be pointed out that these curves represent the averages of at least eight specimens; therefore, it must not be concluded that, provided a fixer is employed, storage of this particular alginate is a safe procedure. Results on any one specimen can be quite erratic not only on account of loss or gain in water but also on account of release of internal strain in the impression. Strain is induced by such factors as the uneven gelling rate throughout the tray, pressure on the tray and removal from the mouth. There is no doubt, however, that the fixing solution used when indicated does reduce the dimensional change during any storage period.

Experience with the dies illustrates the danger involved in storage of the impression, undoubtedly one of the most common causes of clinical distortion. In Figure 3, above right, is shown the fit of the control casting on a stone die poured in alginate A immediately after the 15 minute fixing period. It is evident that this die is an accurate reproduction of the original. Figure 8A shows a stone die which was poured in an impression stored only 30 minutes in an atmosphere of 100 per cent humidity. Although the distortion is small, inaccuracies can be seen at the proximal surfaces. The distortion is much less than that obtained when the impression was stored in air (Fig. 8B) or in tap water (Fig. 8C). On occasion individual specimens may show no visual evidence of distortion when stored in these media for short periods of time, for example, for 30 minutes. These examples are representative of many results and indicative of the general trend. Dies made from impressions stored for longer periods showed a general increase in distortion with time. The longer the span, the greater becomes the distortion.

It is a common belief that should the impression be stored in air for a period of time, the resulting loss of water and contraction can be compensated for by

reimmersion in water. The stone die in Figure 8D was poured in an impression that was stored in air for 60 minutes and then reimmersed in water for 30 minutes. Obviously, the impression did not return to its original dimensions. The distortion is almost exactly the same as that which occurred when the impression was stored only 30 minutes in tap water. Similar results were obtained when varying periods of water immersion were used. The conclusion is that the material does not expand back in the same magnitude or direction in all planes.[15]

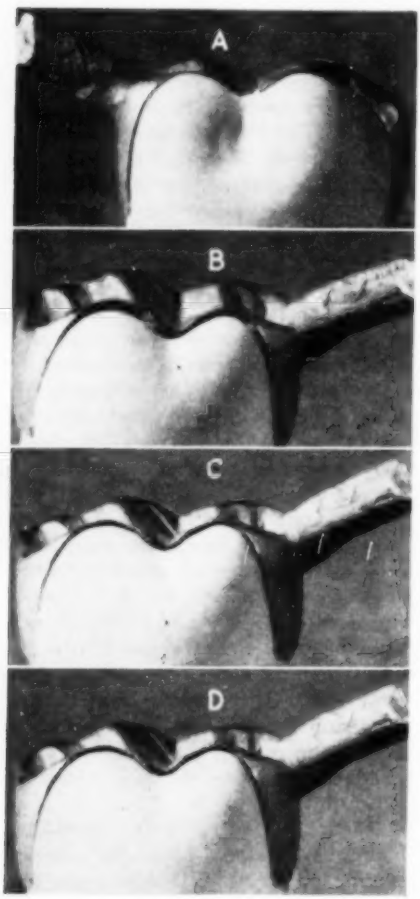

Fig. 8 • A: Stone die poured in impression stored 30 minutes in 100 per cent humidity; inaccuracies can be seen at proximal surfaces. B: Gross distortion resulting after only 30 minutes of storage in air. C: Distortion resulting after storage of impression in tap water for 30 minutes. D: Stone die poured in impression stored 60 minutes in air and then reimmersed in tap water for 30 minutes

POURING THE MODEL

After any excess water or fixing solution in the impression is blown out, the stone die is poured. The recommended water-powder ratio must be used to assure a smooth surface and a constant setting expansion. A mechanical vibrator is used, employing mild vibration; and the stone is added in small quantities and at an even rate of flow. The stone should harden a minimum of 30 minutes before being separated.

A demonstration of the accuracy of the alginate technic is illustrated in Figure 9. A series of five different cavity preparations was made in porcelain teeth (Fig. 9, above). The preparations ranged from a full cast crown to a pinledge with three posts. A single alginate impression was taken of these five preparations, and individual stone dies were prepared. Wax patterns and castings were then made on the stone dies; the fit of the castings is seen in the center illustration of Figure 9. These castings were transferred back to the original preparations (Figure 9, below). Although this degree of accuracy can usually be obtained by proper handling of the alginate technic it is true that on such a long span of varied multiple restorations occasionally inaccuracies may be present. For this reason the reversible hydrocolloid technic may be somewhat less subject to error. Properly handled, however, the alginates almost equal the reversible hydrocolloids in accuracy for this type of procedure.

CONCLUSIONS

An alginate can be successfully employed in an impression technic for indirect restorations if proper adherence is given to certain fundamentals. It is recommended that the technic be confined to cases which involve a short span. If alginate is used, closer attention must be given to various factors than when reversible hydrocolloid is used because of the greater number of variables in the material and in its manipulation.

The proper armamentarium includes a metal syringe for injecting material into cavity preparations, ice water and a clock or a timer. The use of ice water and of higher water-powder ratio is essential to prolong the setting time and to give an adequate working period. Mixing speed and time must be observed strictly.

In these experiments scientific measurements of dimensional changes as demonstrated by changes in the impression tray were compared with changes observable in practical stone dies poured in impressions subject to certain conditions. These data emphasize the necessity of pouring the impression as soon as possible. At times, however, storage is unavoidable. An atmosphere of 100 per cent humidity proved to be the best storage medium for the five commercial alginates tested. Syneresis cannot be compensated for by replacing the impression in water. The fixing solution should be employed when recommended in order to insure a smooth hard surface on the stone model and to reduce distortion during any storage period. Although the impression should remain in the mouth for two minutes after gelation, too long a period of time before removal may produce distortion.

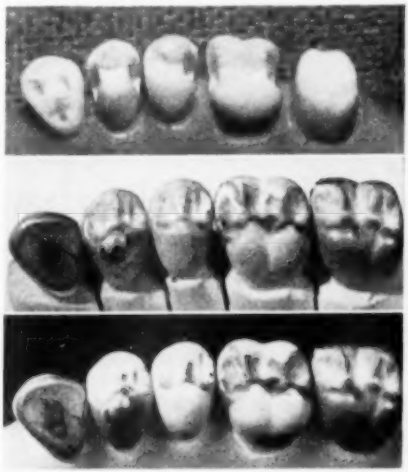

Fig. 9 • Above: Series of five different cavity preparations. Center: Castings made on stone dies poured in alginate impression of preparations. Below: Castings made on stone dies placed back on original preparations; occasional inaccuracies can occur on long spans such as this

Public Opinion • Public opinion is commonly invoked as if it were something incarnate to which an aspiring candidate for office need only apply with the proper incantation in order to secure favor or to win office. *Ogle, Public Opinion and Political Dynamics.*

Restoring the lost vertical dimension of the cleft palate patient

Gordon D. Howard, M.A., D.D.S., Chicago

One of the great problems of abnormal development is the cleft palate and its associated deformities. This paper will be concerned with the restoration of the lost vertical dimension in patients with cleft palates who have mutilated growth patterns subsequent to extensive surgery.

Graber[1] has pointed out that the management of the cleft palate in the past has been largely surgical. Yet the surgical manipulation of growing parts, traumatic interference with growth centers, and forceful mechanical closure of palatal insufficiency have produced results which often are worse than the original disorders. What may appear as a successful surgical closure of the palate in infancy may result in an extreme maxillomandibular discrepancy after potential growth patterns have been fulfilled.

Thompson,[2] in his studies of normal groups, found that the physiological rest position of the mandible is established in infancy and remains constant into senescence. A normal freeway space or interocclusal clearance of 3 to 4 mm. in infancy will remain constant and if no growth aberrations occur and no traumatic interference takes place within the growth centers, the interocclusal clearance in adulthood will still be 3 to 4 mm. Another observation is that of Graber[3] who, in a comparison of cleft palates which had been operated on with ones which were not operated on, found a difference in growth pattern. In the cleft which had not been operated on, growth proceeded along normal lines. In the instance where an operation had been performed, however, the freeway space was not constant. Immediately after surgery, freeway space may be normal. Ten years later, however, a maxillomandibular discrepancy may be pronounced and freeway space may have increased to 10 or even to 18 mm. (Fig. 1).

Often in the instance where an operation has been performed and there is excessive freeway space, there is little or no occlusion. Mastication is difficult. There is an overclosure of the mandible resulting in condylar displacement (Fig. 2). Speech often is impaired, particularly in the production of sibilant sounds. The appearance of the patient when the teeth are fully closed is poor. The child whose appearance is incongruous often is subjected to ridicule by his more fortunate schoolmates. Psychosocial conflicts fre-

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Assistant professor of oral pathology, Northwestern University Dental School. Consulting staff, Northwestern University Cleft Palate Institute.

1. Graber, T. M. Changing philosophies in cleft palate management. J. Pediat. 37:400 Sept. 1950.

2. Thompson, J. R. The rest position of the mandible and its significance to dental science. J.A.D.A. 33:151 Feb. 1946.

3. Graber, T. M. Appraisal of developmental deformities in cleft-palate and cleft-lip individuals. Quart. Bull. Northwestern Univ. M. School 23:153, 1949.

quently develop and resolution of them is problematical.

Restoration of the vertical dimension in the patient with a cleft palate will do much to correct these conditions. This measure falls within the province of the general practitioner and requires no procedure which is not familiar to every practicing dentist. The method to be described has been used extensively for patients at the Northwestern University Cleft Palate Institute.

The technic used for restoration of vertical dimension is simple and is useful with patients for whom other treatment has proved to be insufficient. A full denture is made for the maxilla. The unusual feature of the technic, however, is that the full denture is placed over the remaining maxillary teeth. A full denture rather than a partial appliance is used because the full denture supplies the bulk needed to fill the interocclusal space and also because it provides adequate lip and cheek support by means of its flanges.

The natural teeth are left rather than extracted since the remaining teeth are useful in providing retention. What is more important, the extraction of the maxillary teeth would result in the loss of alveolar bone. Full upper denture service immediately after extraction of the remaining teeth may be satisfactory, but the operator must consider the problems to be encountered 10, 20 or even 60 years later. Even though the prognosis for the remaining teeth is unfavorable, conservation of as much natural tissue as possible is desirable. Furthermore, the natural teeth can be clasped or crowned for precision attachments in the event that more rigid retention is required later for supporting a special speech appliance posterior to the terminal border of the denture.

Fig. 2 • The occlusal vertical dimension. Note overclosure when natural teeth are in occlusion

Fig. 1 • Approximate freeway space in an eight year old patient. Note aberrations of tooth development in the maxilla as compared with apparently normal development in mandible

The teeth under the denture are likely to decay since almost all cleft palate patients have a higher caries susceptibility than average, probably due to lack of function, malocclusion, and malpositioned teeth. The full upper denture inhibits the flow of saliva around the teeth and thus a beneficial flushing and buffering action is inhibited. Some attempts have been made to obviate these difficulties. A study was begun at the Cleft Palate Institute of the effects when patients used bacitracin mixed with den-

Fig. 3 • Setting of the teeth in denture base so as to simulate the dentition of an eight year old

ture adhesive to control caries. The study was abandoned later because of the annoying taste. At the present time, some patients sprinkle the tissue side of the denture liberally with an ammoniated dentifrice although they are not specifically instructed to do so. No study has been made of the effects, however. Experience has shown that if the patient can be taught to clean the appliance properly and frequently, the rate of caries does not increase, and may indeed be lowered. Clinically speaking, caries apparently is no more of a problem with the denture than it is without it.

It might be thought that the denture would interfere with the function of the palate as "restored" by the surgeon. Actually, the full denture often has covered up many of the palatal perforations which have been caused by sutures pulling away.

The dentures have to be remade frequently since the denture is placed over growing tissues and hence must be remade to conform to new physical dimensions. The eruption of permanent teeth, particularly the bicuspids and second molars, must be considered. Of greatest importance, the denture must be altered frequently so that the patient will resemble his playmates. At one age, the incisors must be notched to simulate the mamelons of the newly erupted lower teeth. At another, the lateral incisors must have the appearance of just erupt-

Fig. 4 • Above left: The denture in functional position. Above right: Denture in mouth of patient who is smiling, Below: Patient with teeth in occlusion

ing. At still another, the cuspids must be placed high to give the appearance of naturalness (Fig. 3).

The denture might be more successful if the teeth beneath it were crowned. Because of the factors of growth, however, which require changing of the denture, the placing of crowns at an early age has proved impossible or impractical. Involved crown and bridge restoration is used to better advantage in the adult patient when the teeth are better positioned for crowning and where frequent changing of the denture is not required. In the child with teeth so badly decayed that there is danger of pulpal involvement or loss of the crown, aluminum or stainless steel crown forms can be placed temporarily.

The technical procedures as used by the Northwestern University Cleft Palate Institute are as follows. Intraoral roentgenograms are taken and the mouth is put in good condition. Cephalometric roentgenograms are made in order to study the rest position although this may be done by clinical observation. Study models are made and duplicated in stone to provide a mounting model for the lower denture and a working model for the upper. A tray for the final impression of the upper denture is made of shellac baseplate, providing necessary relief for muscle attachments. Gross undercuts are blocked out on the upper cast and a second shellac baseplate is adapted and trimmed. The cast is then oiled and an impression taken of it with one of the zinc oxide pastes. This forms a firm fitting baseplate to which utility wax is attached to make a biterim. The final impression is taken in alginate or hydrocolloid materials.

Caliper measurements of the rest position are taken from a point on the chin to the tip of the nose. The previously prepared biterim can now be adjusted so that closure will be 3 mm. less than the rest position, or the cast can be mounted to the rest position and the articulator closed 3 mm. before the teeth are set.

The teeth are selected for shade as well as for similarity to the shape of the natural lower teeth. Usually the posterior teeth are of acrylic resin. They are set on the same baseplate used for the biterim. The wax try-in is made and necessary corrections are made. At the insertion appointment the occlusion is adjusted and the final carving of the teeth is done with a disk.

Figure 4, above left, shows the denture in functional position; Figure 4, above right, shows the denture when the patient is smiling, and Figure 4, below, shows the patient with the teeth in occlusion.

A Living Thing • Human nature is not a machine to be built after a model, and set to do exactly the work prescribed for it, but a tree, which requires to grow and develop itself on all sides, according to the tendency of the inward forces which make it a living thing. *John Stuart Mill, "On Liberty."*

An evaluation of temporomandibular joint roentgenography

William James Updegrave, D.D.S., Philadelphia

The development of the Coolidge tube in 1912 resulted in a relatively safe and efficient roentgenographic apparatus that was adapted for general use. Since then the apparatus has been improved continually until the shockproof, compact, easily adjustable roentgenographic equipment now in use utilizes a combination of variable controls and other features which facilitate the practice of dental roentgenography.

In view of the means available for dental and head roentgenography and of the recognition by the members of the dental profession of the value of roentgenographic evidence, it is not surprising to find that the number of dentists who routinely make complete intraoral roentgenographic examinations for all patients is continually growing. Lateral jaw, sinus and cephalometric examinations also are being made more frequently; but examination of the temporomandibular joint is usually avoided, regardless of the evidence demanding a roentgenographic study of this structure.

The reasons most commonly given for this apathetic attitude are: (1) The infrequent demand for roentgenography of the joint does not warrant the installation of the complicated and costly equipment required to produce the desired results. (2) The information gained from a roentgenogram of the temporomandibular joint is often questionable and inconclusive. This paper is devoted to a refutation of these objections and has as its purpose the stimulation of more widespread interest in roentgenography of this joint intimately associated with dental treatment.

Roentgenography of the temporomandibular joint can be accomplished by the following methods: (1) stereoscopy, (2) laminagraphy, (3) arthrography and (4) standard one-plane roentgenography.

Stereoscopy, or three-dimensional roentgenography, is a technic used to demonstrate depth and thickness of a region. Special, nondental equipment is required to take and examine roentgenograms; and even though additional information may be gained from this technic, it is questionable whether the results warrant the installation of this equipment.

The technic of laminagraphy is of special value in demonstrating a plane section of a part at any given point with the surrounding shadows blurred. This method permits examination of the joint at various levels but requires an apparatus of such specialization that it is ordinarily found only in hospitals and institutions.

Presented before the Section on Operative Dentistry combined with the Section on Roentgenology, ninety-second annual session of the American Dental Association, Washington, D. C., October 18, 1951.

Professor of radiodontics, Temple University School of Dentistry.

Arthrography, as advocated by Norgaard,[1] is a technic by which, to some degree, the cartilaginous changes within the joint are demonstrated. It is executed by injecting a roentgenopaque contrast medium into the joint cavities at different intervals and making profile roentgenograms after each injection. This procedure, no doubt, is helpful in the hands of an experienced operator but would be rather hazardous and of questionable value if attempted by one not thoroughly schooled in the technic.

Standard roentgenography in one plane is the technic which is most familiar. Films can be taken in the frontal plane, the superior-inferior plane or in the lateral or sagittal plane. The lateral plane technic is the one of most value in the examination of the temporomandibular joint and the one most frequently followed.

Lateral or profile roentgenograms of the joint taken in the manner usually recommended[2, 3, 4, 5] are not always satisfactory. The outlines of the joint parts being examined are frequently indiscernible and lost in the mass of blacks, grays and whites that appear in the joint region on the roentgenogram. This lack of clarity is due mainly to a superimposition of intervening structures produced by the standard technic. Poor results of this type have discouraged many who would have continued their investigations if the roentgenograms had been more satisfactory.

In 1948 the writer[6] presented a simplified roentgenographic technic that for the most part overcame such difficulties and insured the operator of consistently satisfactory films. This technic incorporated a shortened anode-film distance, slow-speed intensifying screens and an angle board with positioning rods to facilitate tube, patient and film alignment.

During the past four years this technic has been modified, and the accessories have been improved.[7] These now consist of an angle board with a plastic slide tunnel which permits multiple exposures without changing the position of the patient's head, orientation wires to facilitate observation and measurement of condylar movement, threaded plastic ear positioners of different lengths to change the relationship of the head to the film and to give varying aspects of the condyle, a plastic protractor and rod assembly to insure duplication of the patient's head position at subsequent examinations and a diaphragm-filter combination that replaces the cone of the machine (Fig. 1).

This technic has several unique advantages, one of which is the production of clear, sharply outlined images of the joint parts (Fig. 2) as a result of the altered projection of the rays, double-diaphragming and shortened anode-film distance. Another advantage is that multiple exposures, up to six in number, can be taken without changing the patient-tube relationship. This method assures accurate portrayal of the condyle in the fossa for various movements of the mandible. Furthermore, the orientation wires attached to the plastic tunnel appear as one horizontal and two vertical opaque lines on the roentgenogram so that the examiner can note and measure condylar movement with accuracy. Another advantage is that by recording the position of the patient's head on the protractor-rod assembly at the initial

1. Norgaard, Flemming. Temporomandibular arthrography. Copenhagen, Einar Munksgaard, 1947.

2. Sante, LeRoy. Manual of roentgenological technique. St. Louis, St. Louis Book Distributing Co., 1938, p. 89-91, 119.

3. McCall, J. O., and Wald, S. S. Clinical dental roentgenology: technic and interpretation, ed. 2. Philadelphia, Saunders Co., 1947, p. 48, 49.

4. Mustermann, H. W. Principles and practice of X-ray technic and interpretation. Brooklyn, Dental Items of Interest Publishing Co., 1945, p. 79-82.

5. Riesner, Sidney E. Roentgen technique for the mandibular joint. Internat. J. Orthodont. 23:740 July 1937.

6. Updegrave, W. J. Improved roentgenographic technic for the temporomandibular articulation. J.A.D.A. 40:391 April 1950.

7. Updegrave, W. J. Radiography of the temporomandibular joint in orthodontics. Angle Orthodont. 21:181 Oct. 1951.

examination it is possible to place the head in an identical position for subsequent examinations and thus to produce duplicate roentgenograms for comparison. Still another advantage is the fact that the procedure is so mechanical and simplified that the accessories can be constructed easily and the technic learned quickly. Various other technics have been advanced by Lindblom,[8] Higley,[9] Schier[10] and others.

INTERPRETATION OF ROENTGENOGRAMS

Requirements for Interpretation • Interpretation of temporomandibular roentgenograms is dependent first on a knowledge both of the technic employed and of the information which they can be expected to reveal. The referral of patients to a general roentgenologist, who usually reports his findings with little or no consideration for the associated dental problem, is not always satisfactory. Unless the referring dentist is familiar with the technic followed and cooperates closely with the roentgenologist in the interpretation of the films, it would be wiser for him to learn a proven technic and to make the examination himself or else to refer the patient to a fellow practitioner who understands thoroughly the dental aspects of the problem.

In the second place, an intimate knowledge of the anatomy together with a sound concept of the functional activity of the joint is essential before interpretation is attempted. Misconception of anatomic structure and function of the components that make up the temporomandibular articulation has often led to false diagnoses resulting in failure of treatment. On this point Sicher[11] states:

> though there is no doubt about the connection between dental and articular damage, the discussion has given rise to much anatomic and physiologic speculation in an attempt to explain certain clinical symptoms or therapeutic successes. To confuse the matter even more, it has been claimed that articular changes exert influence on the outer, middle and inner ear, and these have been explained by even wilder flights of anatomic imagination. The danger of all this is twofold. Entirely unfounded assertions have been widely quoted and have gained substance by repetition. On the other hand, to overload clinical observations by a heavy superstructure of anatomic nonsense may lead some to discard the kernel of truth with the husk of error.

In dental publications within the past four years, Markowitz and Gerry,[12] Bel-

Fig. 1 • Machine-patient-film alignment for roentgenogram of left temporomandibular joint

8. Lindblom, Gosta. Technique for roentgenographic registration of the different condyle positions in the temporomandibular joint. Sartryck ur Skandinavish Tannlaegeforeming 26:193, 1936.

9. Higley, L. B. Practical application of a new and scientific method of producing temporomandibular roentgenograms. J.A.D.A. 24:222 Feb. 1937.

10. Schier, M. B. A. New technique for radiography of the temporomandibular articulation. D. Items Interest 65:324 April; 65:419 May 1943.

11. Sicher, Harry. Some aspects of the anatomy and pathology of the temporomandibular articulation. Bur 48:14 April 1948.

linger,[13] Sicher[14] and Shapiro[15] have presented articles which are especially recommended for their anatomical and physiological discussions of the temporomandibular articulation. Texts by Sicher[16] and Schweitzer[17] also are recommended for their exhaustive detail and excellent presentation.

In the third place, it is important to realize the limitations of roentgenography and not to depend on its evidence alone in arriving at a final diagnosis. The practice of making a diagnosis from the roentgenogram without considering the clinical and laboratory phases of the examination as well as the history of the condition is not sound.

Schuyler[18] also is of this opinion, declaring:

> While I find roentgenograms of the temporomandibular joint of great value, I consider that diagnosis and treatment planning from them alone may be subject to grave error.

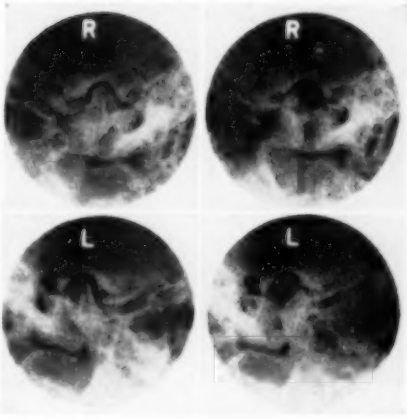

Fig. 2 • Roentgenogram from a finished four-exposure film which was cut, reversed and rejoined to align exposures for interpretation. Above: Right joint closed and opened. Below: Left joint closed and opened

Roentgenography is limited to portrayal of the osseous tissues of the joint and is of value for the following purposes: (1) demonstrating the condyle-fossa relationship in all excursions of the mandible (Fig. 3); (2) revealing the contours of the condyle, fossa and eminence, which should be closely examined for erosion or calcific deposits (Fig. 4); (3) checking the repositioning of the condyle in the fossa during the alteration of the maxillomandibular relationship (Fig. 5); (4) disclosing developmental defects, subluxations, luxations, ankylosis, fractures or other traumatic injuries (Fig. 6).

The nonosseous tissues of the joint are frequently the source of the difficulty. It is not uncommon for a patient to complain of marked discomfort in the area although a roentgenographic examination may reveal a joint normal-appearing both in anatomic outline and in functional relationship. In such cases the importance and necessity of considering and investigating all related factors that could possibly contribute to the joint condition cannot be overstressed.

Discussion of this type of case makes apparent the fourth important requirement for the interpretation of temporomandibular roentgenograms; namely, a knowledge of the multiple conditions which can produce joint pain. Such knowledge is necessary for a correct interpretation of the roentgenographic evidence, considered in the light of the patient's symptoms.

12. Markowitz, H. A., and Gerry, R. G. Temporomandibular joint disease. Oral Surg., Oral Med. & Oral Path. 2:1309 Oct. 1949; 3:75 Jan. 1950.
13. Bellinger, D. H. Present status of arthrosis of the temporomandibular joint. J. Oral Surg. 6:9 Jan. 1948.
14. Sicher, Harry. Temporomandibular articulation in mandibular overclosure. J.A.D.A. 36:131 Feb. 1948.
15. Shapiro, H. Anatomy of the temporomandibular joint. Structural relations and therapy. Oral Surg., Oral Med. & Oral Path. 3:1521 Dec. 1950.
16. Sicher, H. Oral anatomy. St. Louis, C. V. Mosby Co., 1949.
17. Schweitzer, J. M. Oral rehabilitation. St. Louis, C. V. Mosby Co., 1951.
18. Schuyler, C. H. Problems associated with opening the bite which would contraindicate it as a common procedure. J.A.D.A. 26:734 May 1939.

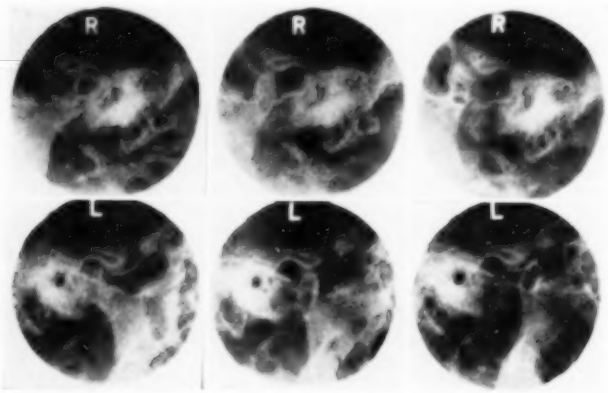

Fig. 3 • Condyle-fossa relationships in mandibular excursion ranging from centric on left to subluxation on right

Etiological Factors • Changes within the joint involving the osseous tissues, the nonosseous tissues or both occasion temporomandibular joint symptoms. The following etiology, classified as to the origin as suggested by Gerry,[19] is given as an aid in determining the diagnostic and treatment procedure.

Systemic Origin • As is true in most specific conditions which are the result of a systemic pathology, consideration and treatment of the original disturbance are paramount. The roentgenographic examination is of secondary consideration in conditions of systemic origin, since it is usually the nonosseous tissues which are first affected and which give rise to the patient's complaint. The general medical history and laboratory examinations are of utmost importance and should compose the initial procedure, to be followed by a roentgenographic examination when indicated.

A general arthritis may involve the temporomandibular joint, but according to Comroe[20] the incidence of involvement in acute rheumatoid arthritis is only 20 per cent. Markowitz and Gerry,[12] who in their investigations found the incidence much lower, state:

> the rich vascular supply of the joint and its surrounding tissues may account partially for this low incidence in accordance with the theories of vasospasm associated with rheumatoid arthritis.

The same investigators likewise found little clinical evidence of temporomandibular joint involvement in conditions of general osteoarthritis; they suggested that their observation may "bear out Robinson's theory of the temporomandibular joint as bearing little if any stress." They did find, however, that in the older age group 35 per cent of the anatomic specimens which they examined revealed definite evidence of degenerative articular disease.

Since the temporomandibular joint is seldom involved in general arthritic conditions and since roentgenography has definite limitations in revealing this involvement, little assistance can be expected from this source. Nevertheless, the roentgenographic examination may show limited condylar excursions and in some advanced conditions erosion or calcific deposits usually associated with the condyles (Fig. 4).

Other general skeletal conditions, as

19. Gerry, R. G. Clinical problems of the temporomandibular articulation. J.A.D.A. 34:261 Feb. 15, 1947.
20. Comroe, B. I. Arthritis and allied conditions, ed 3. Philadelphia, Lea & Febiger, 1944, p. 225.

well as acute infections of the articulation with accompanying cellulitis and osteomyelitis, are rarely encountered by the general practitioner and are not discussed in this paper except to state that the usual end result of a suppurative involvement is ankylosis. This condition can be confirmed roentgenographically (Fig. 6, right and left above).

Extraoral Origin • Subluxation of the temporomandibular joint is not uncommon; and even though regarded as a minor disturbance, this condition can become progressively worse until it reaches the stage where the patient suffers not only physically but mentally as well.

Since subluxation is a partial dislocation, a roentgenogram taken when the patient has his mouth open (Fig. 3) reveals a definite forward movement of the condyle to a point just anterior to the articular eminence. The examiner can feel this forward positioning by placing a finger over the joint area.

Complete dislocation, or luxation, usually recognizable from the deformity it causes, results from the condyle's slipping over the articular eminence and then coming to rest in the zygomatic fossa. This condition can be seen readily on the roentgenogram.

Fractures, contusions, developmental and congenital deformities are less frequently encountered extraoral sources of joint disturbances which usually can be detected by clinical examination and confirmed on the roentgenogram (Fig. 6, left below).

Intraoral Origin • Investigators of temporomandibular joint disturbances are agreed that the most common etiologic factor in cases of articular discomfort and pain is disharmony in occlusal relationship. Even a cursory review of current writings on the subject of the temporomandibular joint proves that this is an accepted fact among periodontists, prosthodontists, oral rehabilitators, orthodontists, pedodontists and

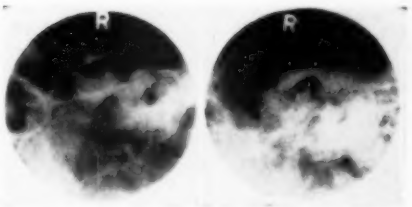

Fig. 4 • Left: Calcific deposit on right condyle. Right: Arthritic change with erosion on right condyle. Left condyles of both patients appeared normal

others investigating joint function; but it is my opinion that the vital importance of the close relationship between joint function and occlusion is not realized by the general practitioner. He is the one who should recognize the conditions which are predisposing to temporomandibular joint disturbance and who should correct these or refer the patient for correction long before the symptoms are manifested in the joint. It is evident that too often the missing teeth, the interfering cusps, the high restorations, the bad chewing habits, the ill-fitting replacements or the reduced intermaxillary relationships are either overlooked or are not considered important enough to correct and are permitted to exist until joint symptoms develop.

Classification of Occlusal Relationships • Occlusal relationship is the key to the majority of joint complaints. In considering the clinical approach to this problem, general practitioners can classify patients into three groups: (1) those with a full complement of teeth (natural or with partial replacements) in varying degrees of malrelationship, (2) those with partially edentulous jaws in which missing teeth have not been replaced, (3) those showing evidence of a decrease in vertical dimension.

Group 1 • It is generally agreed that all mandibular movements begin from

the physiologic rest position in which the mandibular structures are said to be in muscular balance and from which the closing into occlusion is either normal or abnormal. Any occlusal obstruction that interferes with this function produces an abnormal or acquired centric occlusion. This interference ranges from that caused by a single restoration to a disharmonious cuspal relationship of a complete and normal-appearing natural dentition. This latter condition is frequently found in teeth with steeply inclined cuspal planes and with deep overbites. Interference of this type produces a muscular unbalance when the teeth slide from interference into occlusion, which may be reflected in the joint (Fig. 7). On a roentgenogram the joint usually appears normal.

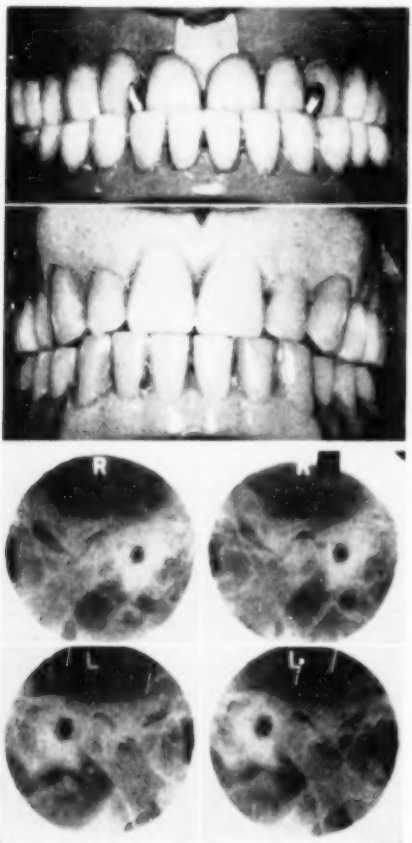

Fig. 5 • Altering the maxillomandibular relationship. Above: Original dentures. Center: New dentures with vertical dimension increased. Below: Roentgenograms showing change in condyle-fossa relationship; left, with original dentures in occlusion; right, with new dentures in occlusion

In view of the many excellent texts and articles on this subject, it is unnecessary to describe the methods of equilibration of the occlusion. Nevertheless, emphasis should be placed on careful adjustment to eliminate any inclined plane interference during mastication, since a degree of freedom of movement of the occlusal surfaces under chewing pressures is necessary to permit co-ordinated action and harmony between the musculature and the joint. The rapid and often notable response of the joint to this treatment is extremely gratifying and at times somewhat amazing. The reaction on the part of the patient is that the joint has been freed and the entire chewing mechanism is more comfortable.

The insertion of artificial replacements in a mouth in which the occlusion has not been equilibrated may be another contributing factor to joint disturbance. The natural imbalance may be accentuated by the replacement and may produce joint arthrosis as a result of the acquired chewing habit induced by necessity. In these conditions the mandibular masticatory pattern is usually away from the side that offers cuspal interference in closing. The abnormal movements of the condyles can readily be seen on the roentgenogram (Fig. 8).

A well-functioning occlusal relationship can sometimes be disturbed by erupting third molars; this important factor should be considered in the search for a cause of temporomandibular disturbance. Block and Harris[21] tell of patients with joint pain which at first they

Fig. 6 • Left, above, and right: Ankylosis of right temporomandibular joint. Left, below: Congenital defect of left joint

attributed to overclosure; further careful study with a central bearing point intermaxillary tracing apparatus disclosed instead a premature contact in the third molar region. Removal of the third molar brought relief. Furthermore, impacted third molars may produce pain which can be misinterpreted as originating in the joint. The importance of eliminating the third molar possibility becomes obvious.

Included also in Group no. 1 are those patients with varying degrees of distoclusal relationship classified by Angle as Class 2 types of malocclusion. It is necessary for a patient with such a malocclusion to execute a marked anterior condylar excursion in order to incise his food. During this movement an increased strain is exerted on the external pterygoid muscles and on the joint capsule, which becomes especially severe if lateral excursion is executed from this position. This strain frequently results in a derangement of the disk and the condyle, each working in separate movements rather than remaining in harmonious relationship.

Another factor conducive to this derangement is the conscious, and sometimes unconscious, habit of the patient who endeavors to improve his appearance by placing his mandible in a more anterior position (Sunday bite). This

21. Block, L. S., and Harris, Elam. Approach to a rational study and treatment of temporomandibular joint problems. J.A.D.A. 29:349 March 1942.

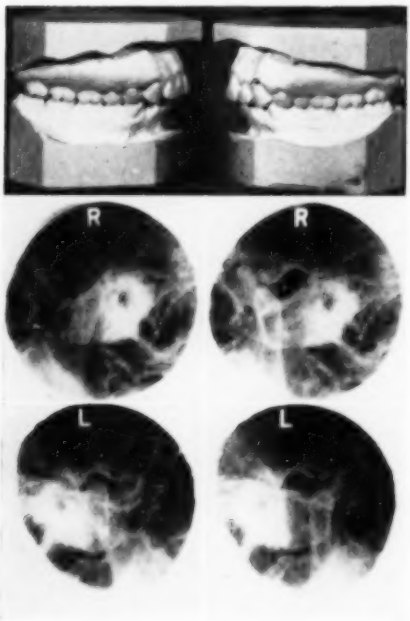

Fig. 7 • Models and roentgenograms of patient with joint disturbance of several years' duration which ceased after equilibration of occlusion

position because of lack of molar support and because of the continual stretching of the musculature adds to the joint disturbance (Fig. 9). Furthermore, recurrent subluxation or dislocation, aggravated by the already stretched joint capsule and muscular dysfunction, may be associated with this type of malocclusion. The need for early orthodontic treatment or occlusal reconstruction for such cases is obvious.

Group 2 • Another type of patient who may suffer from joint disturbance is the patient who is partially edentulous particularly in the posterior regions and who does not wear replacements. Hughes[22] believes that in such a case "the loss of teeth and subsequent derangement of occlusal relations modifies the natural joint harmony and usually subjects the temporomandibular joint to muscular stresses."

Since it is natural to masticate in the region that proves most efficient and most comfortable, the patient with missing posterior teeth of necessity must cultivate an abnormal mandibular chewing pattern. If the masticating function is impaired on one side because of missing teeth, all chewing is shifted to the opposite side with a resultant increased stress

22. Hughes, G. A. Clinical diagnosis and treatment of common temporomandibular disturbances. J. D. Educ. 14:129 March 1950.

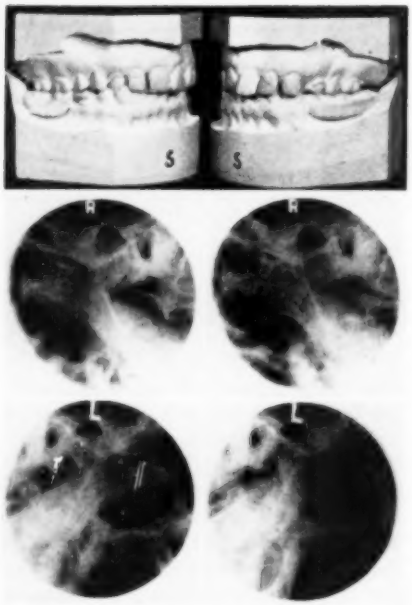

Fig. 8 • Models and roentgenograms of patient who complained of pain in the left joint. Note locked occlusion, deep overbite and poorly fitting dentures. Roentgenograms show rotation of left condyle with little forward glide, a result of the deviation to the left caused by occlusal interference when the mouth is opened

on the joint of the working side and a stretching of the tissue of the joint on the balancing side. The joint disturbance is usually associated with the working side, infrequently with the balancing side and rarely with both sides. The frequency of pain on the working side is the result of two forces: (1) the increased stress exerted on the joint by constant mastication on the one side and (2) the abnormal eccentric movements of the condyle on the working side, characterized by excessive rotation without the forward glide. This rotation results in a derangement of the condylar-disk relationship because it exerts a lateral twisting action of the condyle, which in turn impinges on the thicker vascular border of the disk and produces pain. The eccentric movements of the condyles in function can be observed readily by roentgenographic examination (Fig. 10).

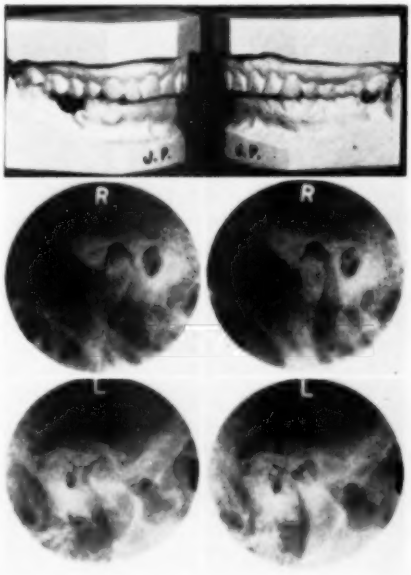

Fig. 10 • Models and roentgenograms showing result of left-sided chewing habit necessitated by missing right mandibular teeth. Compare excursion of condyles in roentgenograms on right taken with the mouth open 1 inch at the incisors

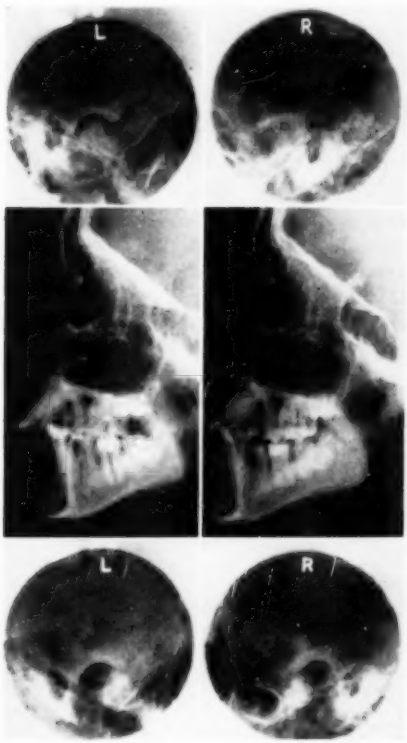

Fig. 9 • Roentgenograms showing distoclusal relationship; both joints were painful. Above and center left: Teeth in centric relationship. Below and center right: Forward positioning of condyle resulting from protrusive habit of patient attempting to improve appearance

Degenerative arthritic changes with limitation of function may be the end result if the traumatic habit is not eliminated. The re-establishing of bilateral functional occlusion by the restoration of missing teeth and equilibration of the bite is the prescribed treatment that is usually beneficial to a degree depending on the age, severity, duration of the trauma and the amount of degenerative change which has taken place.

Group 3 • There is a current trend to "rehabilitate" the oral mechanism of patients who exhibit evidence of decrease in vertical relationship. Unfortunately this "specialty" has been embraced by some who have failed to realize the importance of adequate knowledge and of specialized training necessary in this field. Incorrect and often unnecessary treatment of an extensive and costly nature has resulted all too frequently in dissatisfaction on the part of the patient and the operator.

Schuyler[18] thus sums up the problem:

> One who has made a sincere study of the masticatory mechanism has a keen appreciation of its complexities. He realizes also that the future health and happiness of his patient are at stake when he undertakes reconstructive procedures which necessitate a change in the maxillomandibular relation and the reforming of occluding tooth surfaces. The axiom that "we learn by trial and error" is true. Here, however, we are dealing with human mechanism, and before we tear apart Nature's gift, we must be sure that we can not only rebuild it, but also improve upon it. As mentioned before, the future health and happiness of the patient are our responsibility. It is true that the careful, experienced operator may perhaps restore the face to a more youthful appearance, relieve varied reflex or localized pains, improve hearing, restore the oral tissues to a state of health, etc., with all the beneficial effects upon the general well-being of the patient. Lack of knowledge and error in judgment or technical procedures may, however, be a factor in many of these complications. In the past few years, I have seen many such patients, who might be classed as physical and mental wrecks, patients whose condition might be attributed to restorative procedures.

It must be realized that rehabilitation when indicated offers many advantages, but more knowledge and strategic planning prior to action are imperative. A careful review of Schweitzer's[17] text is recommended.

The role of roentgenography in cases of mouth rehabilitation is important in determining the relation of the condyle

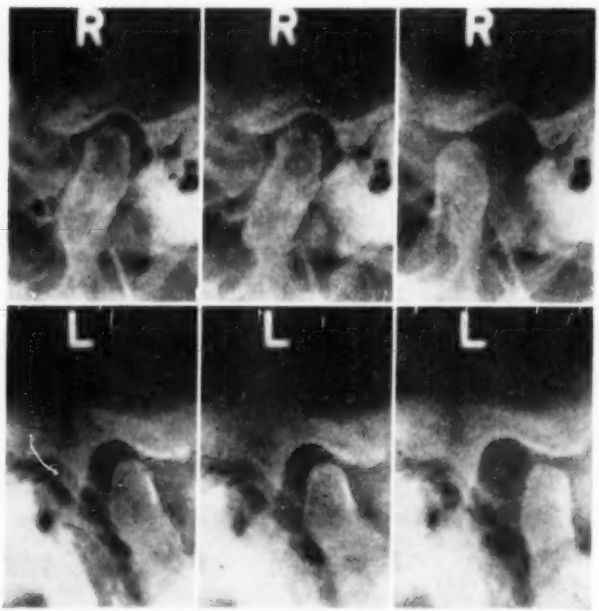

Fig. 11 • Six-exposure technic. Left: With teeth in centric relationship. Center: With mandible at rest position. Right: With the mouth open 1¼ inches at the incisors

to the fossa and to the eminence either with the teeth in centric relationship or with the mandible at rest position or in any other position desired by the operator. The six-exposure technic (Fig. 11) is used to obtain this information.

That, as Maves[23] suggests, roentgenography of the temporomandibular joint can be accurate enough to determine the repositioning of the mandible is rather doubtful; in any event, a complex apparatus would be required to secure sufficiently accurate roentgenograms. Furthermore, according to Leof,[24] the inclination of the temporomandibular joint as seen on the roentgenogram should not determine the new cuspal anatomy. The anterior tooth relation, the periodontal condition and the amount of change of the vertical dimension are more significant factors in this determination.

To complete this discussion, the temporomandibular joint syndrome should be considered briefly in its psychosomatic aspect. Infrequently a patient with neurotic tendencies may complain of joint discomfort and yet on clinical and roentgenographic examination may reveal no evidence of abnormality that could account for the complaint. Close observation may disclose a self-centered individual possessing a fear and anxiety complex, appearing frustrated and relating imaginary ills and complaints. A person of this type is prone to suggestion; often the mere mention of a joint condition is sufficient to put his imagination to work magnifying and creating a condition which is intensely real to him. Landa[25] relates his experience with this type of patient:

> I have known patients who have never experienced any pain or discomfort in the temporomandibular joint area until having had only a few sessions with men who overemphasize bite raising (not to be confused with mouth rehabilitation) commence to experience symptoms in and about the joint. . . . These symptoms, we must conclude, have been introduced to the patients by the physician or dentist through his inappropriate and thoughtless suggestive remarks . . . the patient's mental state alone, may at times, constitute the predisposing cause for a pseudo-temporomandibular joint syndrome.

Recognition of the personality problems of such patients is of paramount importance; psychotherapy rather than mechanical interference is indicated.

CONCLUSION

Among the general practitioners of dentistry there should be a more widespread knowledge of the structure and function of the temporomandibular joint because of the close association of the joint with dental structures. Since roentgenography provides the means of acquiring this knowledge, all investigations of the joint should include a roentgenographic study. It is admitted that specialized technics for roentgenography of the temporomandibular joint are not adaptable for the average dental office; therefore, a simplified technic has been recommended, which can be adopted readily and followed without complicated accessories or special training. Those who use the technic must realize the limitations of roentgenography; roentgenographic evidence should be considered as contributing to the diagnosis though inconclusive by itself.

23. Maves, T. W. Radiology of the temporomandibular articulation with correct registration of vertical dimension for reconstruction. J.A.D.A. & D. Cosmos 25:585 April 1938.

24. Leof, Milton. Revision of accepted dicta on mandibular position. New York J. Den. 20:8 Jan. 1950.

25. Landa, J. S. Temporomandibular joint syndrome viewed from the psychosomatic standpoint. J. D. Med. 6:53 April 1951.

Observations on the clinical use of a chlorophyll dentifrice

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Within the past few years, a number of preparations containing chlorophyll[1] have been offered to the medical and dental professions and to the public. Although the importance of this substance in plant physiology has long been recognized and although some reports of its role in general medicine,[2-5] surgery[6,7] and dentistry[8-18] are available, final appraisal of its use in clinical dentistry has not yet been made.

There are reports in the literature of the effect of chlorophyll on salivary lactobacillus counts.[8,19,20] In the studies which have utilized dentifrices containing chlorophyll, the subjects brushed their teeth in a definite manner at specific times (controlled brushing). Since chlorophyll-containing dentifrices can be purchased without prescription "over the counter," it is most likely that persons using such a dentifrice use it as they use other dentifrices rather than according to a controlled brushing technic. For this reason the effects of "uncontrolled" brushing of the teeth with a chlorophyll-containing dentifrice were studied.[21]

METHODS AND MATERIALS

Study I. Effect of Uncontrolled Brushing with a Chlorophyll Dentifrice on Salivary Lactobacillus Counts • Twenty patients, aged 5 to 64 (5 males and 15 females), were selected for this study with no regard for their previous dental history. After a clinical and roentgenographic examination but prior to prophylaxis or treatment, a specimen of stimulated saliva was obtained from each patient; the determination of the lactobacillus count according to the Hadley technic[22] was made by the caries-control laboratory of the School of Dentistry, University of Pennsylvania, by the routine method used there. The collection of all specimens was supervised by the same person. A supply of a chlorophyll-containing toothpaste sufficient to last for

This study was supported (in part) by a grant-in-aid from the Ryston Company, Mount Vernon, N. Y.

*Division of research, Hannah and Harry Posner Research Laboratory, School of Dental and Oral Surgery of the Faculty of Medicine, Columbia University.

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3. Bowers, W. F. Chlorophyll in wound healing and suppurative disease. Am. J. Surg. 73:37 (Jan.) 1947.

4. Moss, N. H., and others. Effectiveness of Chloresium in wound healing and deodorant effects; report of Council on Pharmacy and Chemistry. J.A.M.A. 140: 1336 (Aug. 27) 1949.

5. Langley, W. D., and Morgan, W. S. Chlorophyll in treatment of dermatoses; report of 40 cases. Pennsylvania M. J. 51:44 (Oct.) 1947.

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7. Smith, L. W., and Livingston, A. E. Chlorophyll; experimental study of its water soluble derivatives in wound healing. Am. J. Surg. 62:358 (Dec.) 1943.

8. A.D.A. Council opposes new dentifrice promotion. J.A.D.A. 39:224 (Aug.) 1949.

9. Hein, J. W., and Shafer, W. G. Chlorophyll as a potential caries preventive agent. Pennsylvania D. J. 16:221 (June) 1949.

10. Bailey, H. How to keep from getting false teeth. Better Homes and Gardens 29:32 (Nov.) 1951.

Table 1 • Salivary lactobacillus counts (in thousands) of 20 patients before and after 6-9 months of uncontrolled toothbrushing with a chlorophyll dentifrice

Patient	Before brushing Period (1)	After 3-6 mo. brushing Period (2)	Difference (2-1)
1	2.20	0.60	−1.60
2	5.00	115.00	+110.00
3	52.50	4.00	−48.50
4	57.80	10.10	−47.70
5	7.20	15.00	+7.80
6	21.90	32.50	+10.60
7	76.70	65.00	−11.70
8	15.80	12.60	−3.20
9	15.70	108.50	+92.80
10	8.00	128.00	+120.00
11	45.00	12.50	−32.50
12	24.00	34.50	+10.50
13	4.50	73.00	+68.50
14	20.60	2.70	−17.90
15	0.00	2.60	+2.60
16	0.05	0.00	−0.05
17	0.50	1.20	+0.70
18	10.30	0.00	−10.30
19	23.00	579.00	+556.00
20	428.00	43.50	−384.50
Average	40.94	62.015	+21.075

eight months was distributed to each patient. All patients were asked to brush their teeth in their usual manner twice daily and to continue all other oral habits, including diet, as before. During the next several months, routine dental treatment was performed as needed. A second saliva specimen was obtained from all patients three to six months after the original sample had been taken. The time of day at which the first and second samples were taken was similar for each patient. The lactobacillus counts were performed according to the same technic in the same laboratory by workers who knew nothing of the experiment being performed.

Study II. Effect of Uncontrolled Brushing with a Chlorophyll Dentifrice on Chronic Gingivitis • One hundred and nine patients, aged 11 to 65 (53 males and 56 females), constituted the experimental group. The patients had chronic gingivitis in varying degrees, with or without periodontal involvement. These patients received routine dental treatment, which did not include thorough periodontal treatment, and were given a large supply of a chlorophyll-containing dentifrice. One hundred and thirty-seven comparable patients, aged 9 to 63 (62 males and 75 females), who had gingivitis with or without periodontal involvement, constituted a control group; they received similar routine dental care but continued to use the dentifrice of their own personal choice. No particular toothbrushing instructions were given to either group beyond a request that the patients brush their teeth twice daily. All patients were examined clinically before and after a period of six to nine months. Color photographs of the anterior segments were taken at the time of the examination. The gingival condition of the patients was evaluated before and after the six to nine month period according to: (1) clinical appearance of the gingivae; (2) gingival sensitivity incident to subgingival curettement; (3) gingival

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17. Goldberg, S. L. Use of water soluble chlorophyll in oral sepsis, experimental study of 300 cases. Am. J. Surg. 62:117 (Oct.) 1943.

18. Griffiths, Barbara, and Rapp, G. W. Effect of water soluble chlorophyll on mouth organisms. (Abst.) J. D. Res. 29:690 (Oct.) 1950.

19. Shafer, William G., and Hein, John W. Further studies on the effect of chlorophyll on experimental dental caries. (Abst.) J. D. Res. 29:666 (Oct.) 1950.

20. Rapp, G. W. Chlorophyll: the green wonder drug. Illinois D. J. 18:405 (Oct.) 1949.

21. The dentifrice used in this study was supplied by the Rystan Company and is available commercially as Chloresium.

22. Hadley, Faith P. A quantitative method for estimating Bacillus acidophilus in saliva. J. D. Res. 13:415 (Oct.) 1933.

hemorrhage incident to subgingival curettement (estimation based on ease of provocation, duration and quantity of bleeding); and (4) the patient's own subjective evaluation of his gingival appearance, gingival hemorrhage and gingival sensitivity.

RESULTS

Study I • The lactobacillus counts of the 20 patients studied appear in Table 1. There were 10 patients who had higher counts and 10 patients who had lower counts after three to six months' brushing with a chlorophyll dentifrice. There was an average increase of 21.075 thousands in the count after the experimental period. A comparison of these counts was made first by converting to the logarithms of the counts and then by performing a t-test on the differences in individual counts. The average difference in the logarithms of the counts was not found to be significant.

Study II • The findings in this study are listed in Table 2. It is apparent that no important differences in gingival appearance or gingival sensitivity were observed between the two groups at the end of the experimental period. It was found that 10 per cent of those using the chlorophyll dentifrice showed an increase in gingival bleeding compared with 17 per cent in the group using a dentifrice of their own choice. A greater percentage of those using the chlorophyll dentifrice (22 per cent) evidenced a decrease in gingival bleeding than of those in the control group (12 per cent). While the differences are suggestive, they are not clearly significant. A significantly greater percentage of those patients who used the chlorophyll dentifrice felt that there was an improvement in their gingival condition. This latter effect, of course, might be due to the fact that these patients knew that they were using a "medicated" dentifrice so that this knowledge might have influenced their estimate of their gingival condition.

Table 2 • Effect on gingivitis of uncontrolled toothbrushing with a chlorophyll dentifrice

	Gingival sensitivity	Clinical appearance	Gingival hemorrhage	Subjective symptoms
Chlorophyll dentifrice				
Improvement				
Definite	1	0	2	2
Slight	11	9	22	27
No change	92	98	74	69
Condition worse	5	2	11	11
Total cases	109	109	109	109
Dentifrice of own choice				
Improvement				
Definite	2	1	2	0
Slight	5	5	14	13
No change	125	127	98	108
Condition worse	5	4	23	16
Total cases	137	137	137	137

SUMMARY

1. The effect of uncontrolled toothbrushing with a chlorophyll-containing dentifrice on the lactobacillus counts of 20 patients was studied before and after six to nine months' usage of this dentifrice. No effect on the lactobacillus counts was noted.

2. The effect of uncontrolled brushing with a chlorophyll-containing dentifrice on chronic gingivitis was studied. One hundred and nine patients used the experimental dentifrice, while 137 patients used a dentifrice of their own choice. At the end of six to nine months, no important differences were observed between the two groups with regard to changes in gingival appearance or gingival sensitivity incident to subgingival curettement. While there was some tendency towards decreased gingival bleeding in the chlorophyll dentifrice group compared with the control group, the difference was not statistically significant.

The ultramicroscopic structure of enamel and dentin

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The electron microscope, one of the most important new instruments of the last ten years, is being used in many parts of the world to investigate the ultramicroscopic structure of matter. The physical and chemical properties of substances seen in the optical microscope over the last century and a half may be examined in a new light, when this instrument with its tremendously increased magnification and resolving power is used. Since 1944 an ever-increasing number of dental research workers, in this country and abroad, have been exploring the ultramicrostructure of enamel and dentin. Ultimately it is hoped that the observation at this level of diseased and malformed dental tissues will be possible, but naturally it is necessary that a complete understanding of the normal state be reached first. The introduction of this new instrument has resulted in the development of basically different histological technics from those employed in optical microscopy. They may be divided generally into two categories: (1) replication and (2) thin sectioning.

REPLICAS OF ENAMEL AND DENTIN

The study of hard tissues with the electron microscope is difficult because of the extremely limited penetrating power of the electron beam in present day commercial microscopes. A specimen with a thickness greater than 0.2 micron and an area more than one square millimeter is generally unsuitable. Up to the present time, these rigid specifications place a definite limit on what can be examined profitably.

The first technic, the preparation of ultra-thin plastic replicas, models of surfaces made from microimpressions, was the first procedure adopted, and it is still widely used.[1-8] Because it is impossible

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at the present time to cut fully calcified enamel and dentin thin enough for electron microscopy, this method of duplicating surface contour in films sufficiently thin to be penetrable to the beam of electrons is the most satisfactory one available.

The surface to be observed must be flat and microscopically smooth. An extremely high polish is obtained with various grades of emery paper, followed by an application of a suspension of aluminum oxide. The amorphous layer so formed must then be etched off if the true structure of the underlying material is to be seen. The application of one tenth normal hydrochloric acid to the surface for a period of five seconds is sufficient to accomplish this.

After examination of the many technics for microreplication, a double impression method was utilized[9] for the studies to be described which would give a positive replica of the surface. A drop of 15 per cent polyvinyl alcohol was placed on the surface, allowed to dry and stripped off. The impression side of this film was then coated with a thin layer of 0.75 per cent polyvinyl formal and dried for approximately five minutes. Since the alcohol film was water soluble, the two layers were easily separated by floating the double film on water for a few minutes and salvaging the remaining undissolved replica. This film was then placed in a specimen screen and metal shadowed.

Enamel, as it appears through the electron microscope, is illustrated in Figure 1. A single enamel rod in cross section occupies the central portion of the picture, and is surrounded by portions of five adjacent rods. The cementing substance is the cloudy white material surrounding the rod cylinders and forms the dividing line between rods. The rod cylinders are impregnated with crystals. While these crystals appear sparsely settled in the cementing substance, they are not as evenly distributed and densely packed as they are in the rods. Amorphous material is found in both regions, but to a greater degree between the rods. Specialized structures, such as individual rod sheaths and fibrous matrix, were not visible here as they were in other studies.[10-12] It is interesting to note, however, that in the hundreds of individual teeth studied, no two could be said to be identical with regard to their ultramicroscopic composition, even though identical technics of preparation were followed as closely as possible.

The ultramicroscopic crystallites within the rod cylinders appear to be arranged in a more orderly fashion when enamel rods are viewed longitudinally (Fig. 2). These particles are oriented 20 to 40 degrees to the long axis of the rod, are densely packed and of a fairly constant size. Cementing substance was not visible in this section because in none of the four rods appearing was it possible to get one section directly through the center of one rod, and there appears to be an overlapping of the rod cylinders. It is apparent at this point that observing enamel from a longitudinal rather than cross-sectional aspect should yield more information with regard to its ultramicroscopic structure.

The observation of caries at the site of early initiation of the lesion was the original goal of this study. In an attempt to view directly the changes that take place in these areas, several hundred replicas were made. Because a film cannot be removed from a rough surface it was necessary that the original integrity of the sur-

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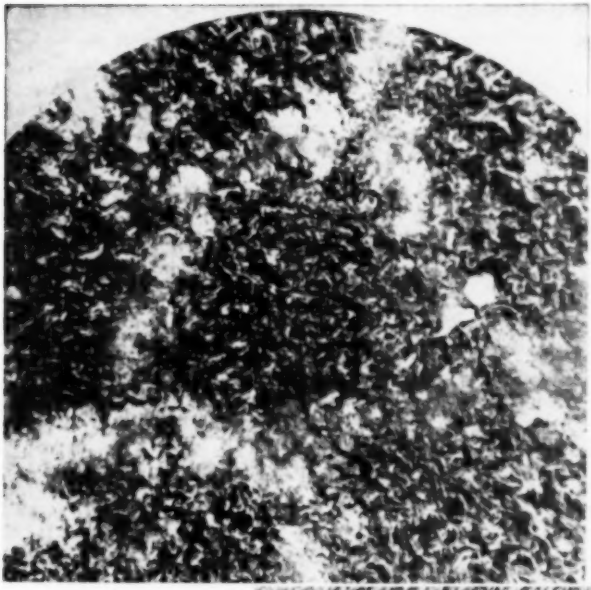
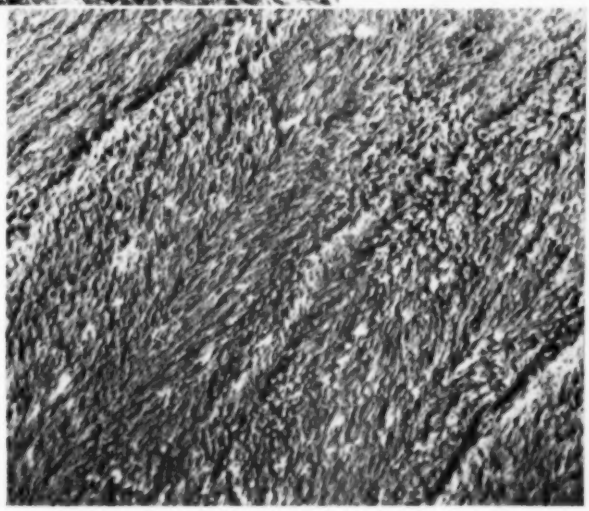


Fig. 1 • Cross section of enamel rods. Chromium shadowed replica. ×9,500

Fig. 2 • Longitudinal view of enamel rods. Chromium-shadowed replica. ×8,000



face be as nearly preserved as possible. An early lesion is shown in Figure 3. It is impossible to tell in this instance whether the true structure has been replicated accurately, or whether crystals themselves have been removed on the impression and appear free on the substrate. It is in the preparation of this pathologic enamel that the greatest development in specimen preparation and

handling will have to come if the electron microscope is to be used profitably in dentistry.

The replica technic was not as suitable for the study of dentin. Grinding tubules through their long axes revealed some fibrous structure with intermittent openings or auxiliary canals (Fig. 4). These tissues were easily mutilated by grinding and it was impossible to discern whether there was a lining present or whether merely the unground interwoven fibrous material of the matrix was being observed.

ULTRA-THIN SECTIONS OF DENTIN

Present-day methods for thin sectioning, while not applicable to undemineralized enamel and dentin, are readily adaptable

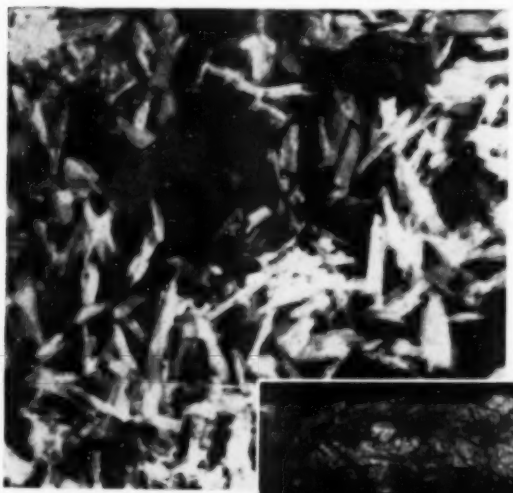


Fig. 3 • Crystallites in carious enamel. Chromium-shadowed replicas. ×35,000

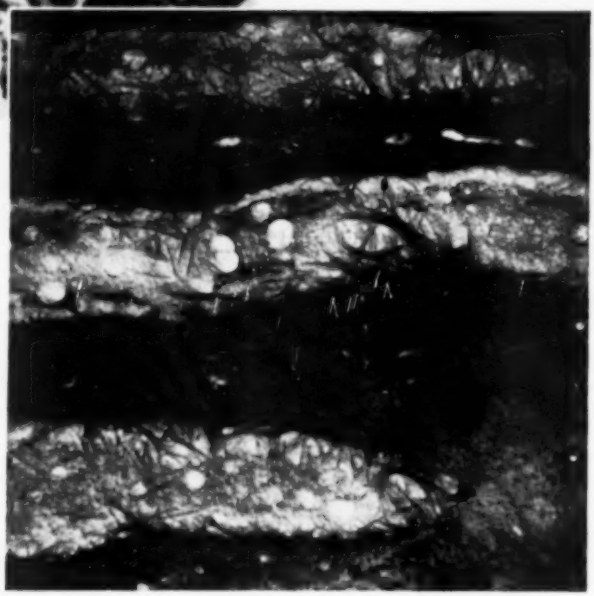


Fig. 4 • Replica of ground dentin showing dentinal tubules in longitudinal view. Fibers lining the tubule wall and secondary tubuli openings are visible. Chromium shadow. ×6,000

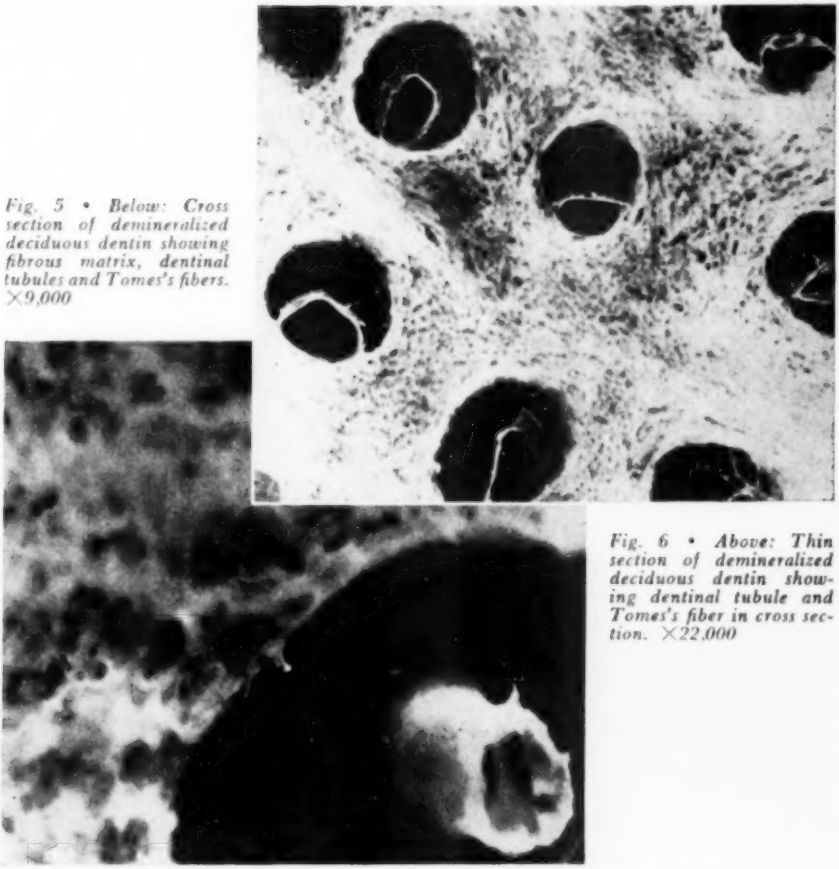


Fig. 5 • Below: Cross section of demineralized deciduous dentin showing fibrous matrix, dentinal tubules and Tomes's fibers. ×9,000

Fig. 6 • Above: Thin section of demineralized deciduous dentin showing dentinal tubule and Tomes's fiber in cross section. ×22,000

to soft tissues and demineralized tooth structure. Many attempts have been made in the last few years[7] to develop thin-sectioning technics with varying success. It becomes evident that because of different consistencies, a technic for cutting soft tissue is not necessarily satisfactory for decalcified hard tissue. A method first described by Newman, Borysko and Swerdlow,[10] and modified by Scott and Wyckoff,[8] was adopted for the present study.

Freshly extracted teeth were demineralized in nitric acid, fixed, dehydrated, and embedded in a mixture of butyl and methyl methacrylate. A standard rotary microtome was modified by replacing its specimen holder with a brass block to hold the plastic-embedded specimen. When the block was cooled below room temperature by evaporation of carbon dioxide which was passed through it, the brass contracted. The gas was then shut off and the block expanded as its temperature again approached that of the room. The resulting expansion advanced the specimen into the path of the knife at increments of only a fraction of a micron

and extremely thin sections were produced. The standard knife for the microtome was discarded in favor of the glass knife described by Latta and Hartmann.[13] Specimens tend to curl when cut so thinly but were readily flattened by floating in dioxane and water. After the specimens were washed in distilled water, the embedding medium was dissolved in amyl acetate. All sections were shadowed with either palladium or chromium to improve contrast and render them less destructible in the electron beam.

The observation of the organic components of dentin with the electron microscope by means of both replicas and thin sections has been reported by others.[4, 12] As could be expected, how-

13. Latta, H., and Hartmann, J. F. Use of glass edge in thin sectioning for electron microscopy. Proc. Soc. Exper. Biol. & Med. 74:436 June 1950.

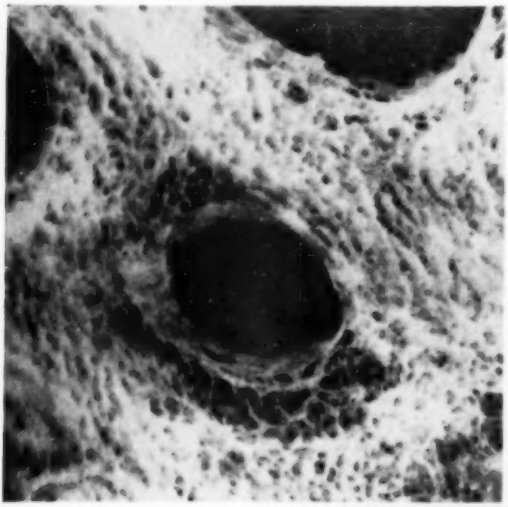
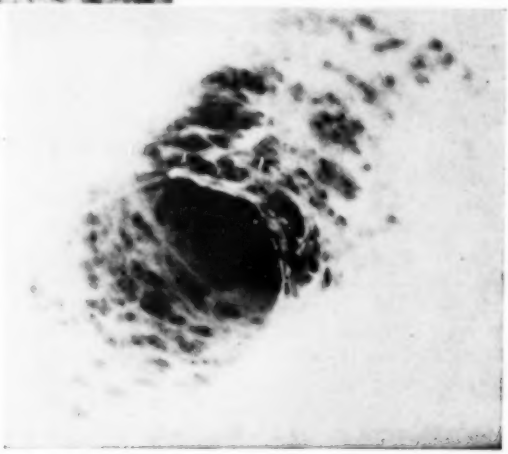


Fig. 7 • Deciduous dentinal tubule showing membranous lining being pulled away from the matrix. ×12,000

Fig. 8 • Thin section of deciduous dentin showing empty tubule devoid of fiber or lining but fibrous matrix surrounding. ×8,000



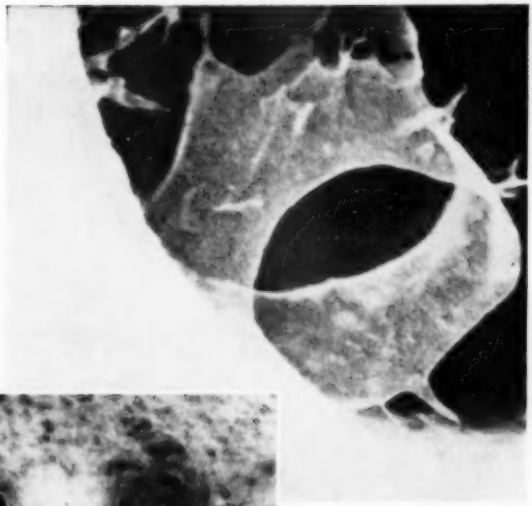


Fig. 9 • Thin section of dentin. Cylindrical structure is evidently lining of tubule pulled away from dentin matrix. ×42,000

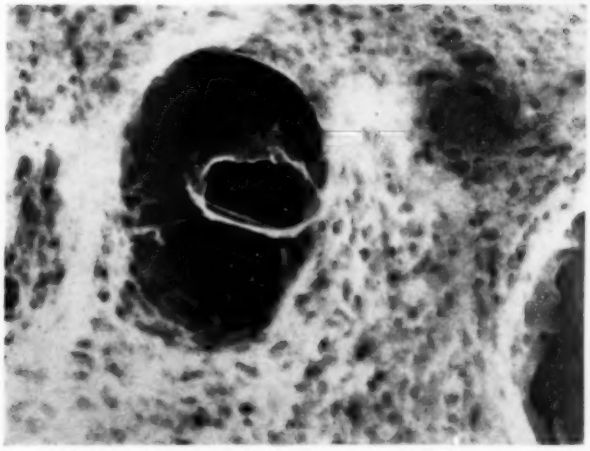


Fig. 10 • Thin section of dentinal tubule showing membranous lining being pulled away from matrix to a greater degree than in Figure 9. ×12,000

ever, many discrepancies exist between various findings, and the present work was begun in the hope of drawing a few definite conclusions with respect to these differences. Magnifications such as those possible with the electron microscope should be a great aid in the examination of the so-called sheath of Neumann, dentinal fibers (Tomes's fibers) and of the general structure and function of the dentinal tubules.

The thin delicately fabricated Tomes's fibers and their related structures are seen readily in thin sections of decalcified dentin. A cross section of eight tubules (Fig. 5) shows Tomes's fibers apparently connected to the walls by extremely fine filaments. Fibrils of the dentinal matrix appear in varying densities, probably more densely packed in the regions directly surrounding the tubules.

Apparently the fiber passes through the canal free of its wall and emerges as a hollow tube (Fig. 6). Gerould (1945) and Syrrist (1949) showed this clearly.[1, 6, 12] No differentiation is apparent in the matrix as it surrounds the fiber that would indicate a lining.

In Figure 7 there appears to be a definite thin membrane lining the tubule.

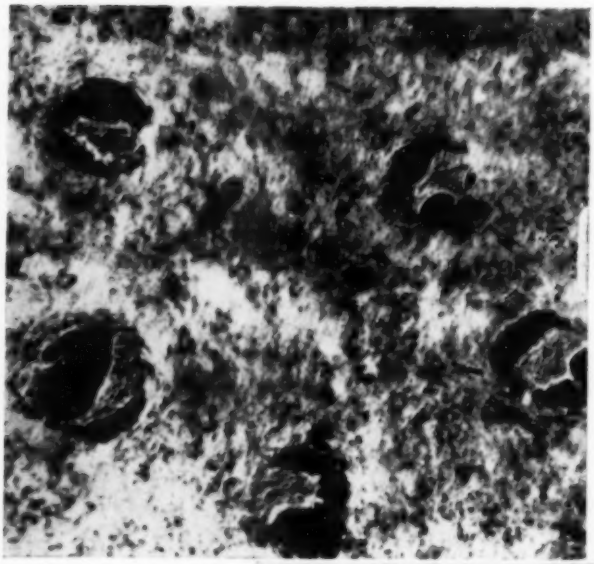


Fig. 11 • Cross section of dentinal tubules with Tomes's fibers which apparently contain some structure. ×8,000

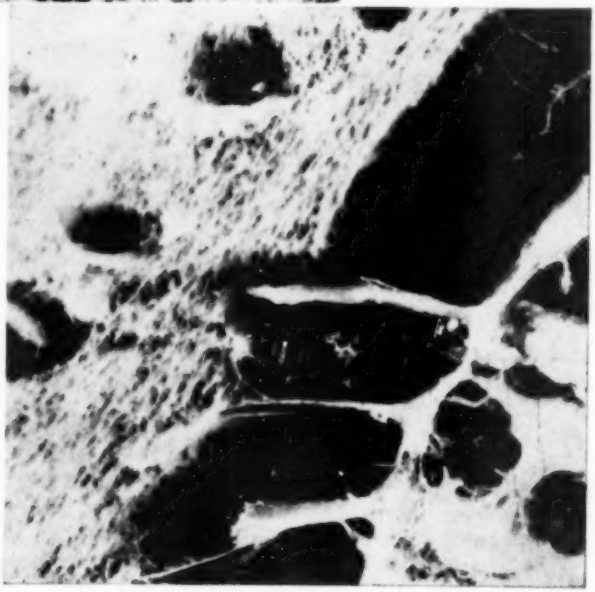


Fig. 12 • Thin section of junction of pulp and dentin, pulp on right and dentin on left. Thick fibers of pulp apparently pulled from tubules in dentin and in some cases severed. ×5,000

This membrane is pulling away from the dentin matrix and apparently is stretching the fibers of the matrix to such a degree that many have been severed.

Examination of Figures 5 to 10 indicates two distinct possibilities. Either the cylindrical-shaped object in the center of the tubules is the cross section of an empty fiber, or it is the original lining of the tubule from which the matrix has separated on most of its circumference. Observation of many specimens under the electron beam leads one to favor the latter theory. The two substances, one the membranous material, the other fibrous, would change shape under the electron beam at different rates, the former more nearly maintaining the original size and shape of the tubule. If this is true, the fibrous connections between matrix and membranous tube could well be fibers of the matrix which have been stretched and extended as the tubule contracts.

Figure 8 shows an empty dentinal tubule with neither a lining nor a fiber.

In a few cases it has been possible to prepare demineralized dentin so that when the tubules are cut in cross section, there appear Tomes's fibers which contain some form of structure (Fig. 11). Figure 12 illustrates longitudinally, fairly solid fibers entering the tubules of dentin (left side of picture) from the pulp (right side of picture). Presence of other fibers within Tomes's fiber, as reported by Helwig and Menke,[14] has not been clearly found.

It is difficult to make positive statements regarding the composition of any material which no doubt has been changed through handling and the subjection to foreign elements, as this tissue must be in order to be studied with the electron microscope. Undoubtedly there are many artifacts. With the evidence at hand, a few assumptions may be made regarding the delicate membranous tubes transversely sectioned and rather regularly observed in fairly intact state. As a result of light microscopic observations, it has been taught that these tubes are extensions of odontoblastic cells extending through to the dentoenamel junction. When observed at the highest magnifications possible with the electron microscope, these processes still appear membranous as a true cell wall, and bear no resemblance to collagenous or elastic fibers, nerve fibers or circulatory vessel walls. While these tubular membranes in cross section appear to be devoid of cytoplasm, in most cases a minority of sections contain some material. Possibly by chance the cytoplasm has been preserved in some cases and in others a cell inclusion has been sectioned through. If these extensions are vital processes of pulp cells, it follows that any clinical procedure wherein dentin is entered is bound to affect the pulp since cell bodies of these processes exist in the pulp.

SUMMARY

The electron microscope, with its greatly increased magnification and resolving power, can make visible ultramicroscopic structure heretofore invisible, and make possible more detailed observation of material only grossly visible with the optical microscope. Crystallites within individual enamel rods are seen in cross section and longitudinal section.

Thin sections of dentin are especially informative in revealing the finer structure of the dentinal tubules and their contents.

14. Helwig, G., and Menke, E. Elektronenmikroskopie an Zellfortsatzen im menschlichen Zahnbein. Naturwissenschaften 36:281, 1949.

Root canal therapy using polyantibiotics for disinfection

Ralph M. Roberts, D.D.S., M.S.D., and Richard W. Slatten,† D.D.S., Richmond, Va.*

Pulp canal therapy has been approached by the dental profession over the years from various aspects.[1] Various plans of procedure have been advocated. Of considerable interest has been the possible connection between the phenomenon of focal infection and teeth which have undergone pulp canal therapy.

Thought should be given as to what terminology is best when referring to the tooth with a pulp canal filling. One hears reference to "devitalized" or "dead" teeth. As a matter of fact, functioning teeth, with normal periodontal attachments, should not be called "dead" teeth; dead tissue is not tolerated by the body. In the same manner, one hears reference to the "non-vital"[2] tooth. Such terminology has probably arisen as a result of misconceptions regarding the functions of the tooth and its component parts. The primary function of the pulp is to act as a formative organ; once this has been accomplished the main function of the pulp has been fulfilled. The other functions it performs are secondary. The life of the tooth, as a useful organ of the mouth, is not dependent on the pulp but on the integrity of a normal and healthy periodontal membrane. Whenever an intact periodontal membrane is maintained around the cemental covering of the root, that tooth can be maintained as a vital and functioning member of the dental apparatus. Therefore, reference in this article will not be made to "dead" or "devitalized" teeth but to "pulpless" teeth. Such teeth may function almost as well and as long as teeth that contain vital and normal pulps.

FOCAL INFECTION AND THE PULPLESS TOOTH

The role of the pulpless tooth in focal infection is a matter of controversy. The concept of focal infection implies the presence of a primary focus of infection somewhere in the body, with dissemination of bacteria from this focus giving rise to infection elsewhere in the body. This theory became popular around 1910 when Hunter came to this country and denounced "septic dentistry." Actually, most of his remarks were leveled at the crown and bridge work being done at that time; however, current trends of thinking direct attention to the pulpless

*Associate professor of clinical oral pathology, diagnosis and therapeutics, Medical College of Virginia, School of Dentistry.

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2. Cohn, Charles. Treatment of non-vital teeth. Oral Health 33:525 Sept. 1943.

tooth in connection with his remarks. The medical profession in the early 1900's seized on the theory of focal infection in the hope that many obscure conditions confronting them might be relieved through the elimination of localized areas of infection. The dental profession, being anxious to cooperate, joined the crusade and countless numbers of teeth were indiscriminately removed.

The pendulum, so far as medicine is concerned, has swung away from the theory that the elimination of focal infection is a panacea for man's varied ills and obscure ailments. It is time that the pulpless tooth be considered in the same light. An appraisal of the validity of the concept of focal infection is not in order here but it might be pointed out that very few diseases, alleged to come from primary foci of infection, have been proved to be due specifically to the localization of microorganisms in a secondary site. In fact, many of these conditions are now known not to be infectious in nature at all.

Such remarks should not be interpreted as condoning the ignoring of infection in the body nor as implying that infection in or around the oral cavity is harmless. On the contrary, all infections are harmful to varying degrees and should never be ignored, for each undoubtedly leaves its mark. It is exceedingly difficult, however, to rationalize the attitude of those who abhor the presence of a pulpless tooth, regardless of its status, yet who will ignore the presence of generalized periodontal disease in which the amount of infection present may be a hundred times greater than that in the pulpless tooth.

CONSIDERATIONS IN THE TREATMENT OF NECROTIC PULPS

There are a number of steps that must be successfully executed in pulp canal therapy in order to achieve satisfactory results. Among them are the following:

1. Selection of cases.
2. Instrumentation of the canal.
3. Process of disinfection.
4. Filling or obliterating the canal.

Each of these steps is of sufficient importance to warrant individual comment.

Selection of Cases • Generally speaking, the teeth of individuals who are suffering from a general debilitating disease should not be selected for treatment, for the obvious reason that defensive measures of the body must be depended on to assist in the elimination of infection. All such individuals are poor surgical risks.[3]

So far as local conditions in the tooth itself are concerned, certain criteria should be met. The tooth should be one which affords proper access and which allows proper instrumentation, disinfection and filling. The tooth should be one with good periodontal attachment about the whole root except in the periapical region where it may have been interrupted by infection. If the full length of the root canal is not accessible, or if it cannot be disinfected and obliterated somewhere in the disinfected region, treatment should not be undertaken. Contraindications for root canal therapy include the presence of broken instruments or other obstructions which cannot be bypassed, roots which are perforated, calcifications which cannot be penetrated and previously placed fillings which cannot be removed.

The extent of the involvement, as indicated by the size of the radiolucent area in the periapical region, appears to have little bearing on whether treatment may be successfully implemented. Reference has been made to the inadvisability of undertaking treatment where radiolucent areas seem to involve over one

3. Auslander, W. P. Root canal therapy techniques for the general practitioner. New York J.D. 21:451 Dec. 1951.

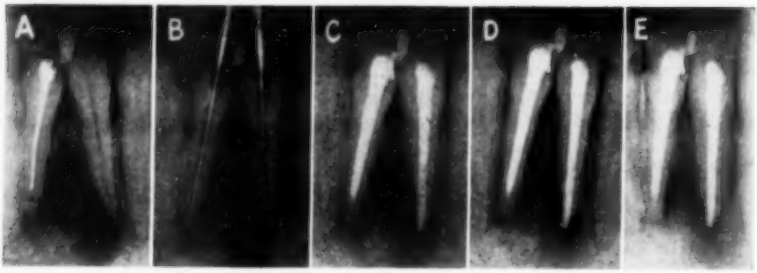

Fig. 1 • A: Roentgenogram taken before treatment was begun, September 20, 1951. B: Pathfinders in place, October 8. C: Film taken November 15, showing filled root canals. D: Routine check-up film, January 10, 1952. E: Film taken March 25

third of the root. There are times when the larger areas will heal as readily as the smaller ones. An example of this is shown in the following case:

The patient was a 20 year old girl. A cystic formation was suspected at the time of examination. An attempt had been made two years previously to treat and fill the left central incisor. Openings were made into the pulp chambers, the old filling was removed from the left central incisor and the patient was dismissed. An acute inflammatory reaction ensued and the patient was given 300,000 units of penicillin intramuscularly. The right central incisor was treated at this time. Polyantibiotic paste was sealed in the root canals of both teeth.

Treatment was begun on October 8, 1951 (Fig. 1,B). At the completion of routine treatment by instrumentation and disinfection, gutta-percha and cement were placed in the coronal openings. The root canals were filled on November 15 (Fig. 1,C). Roentgenograms taken on January 10, 1952 (Fig. 1,D) indicated that the teeth had moved closer together and bone was filling in the periapical regions. Figure 1, E, taken March 25, shows additional bone formation in the periapical regions and a still closer approximation of the teeth.

It is more important to consider the type of pathosis present rather than the apparent extent of it. If the integrity of the tooth is otherwise not questionable, the amount of periapical involvement is of little concern. Usually the radiolucent area will "fill in" regardless of size, either with or without an apicoectomy, provided there have been no irreversible tissue reactions. When cysts have formed or cementum is denuded and necrotic, apicoectomy is necessary if healing is to occur. Under certain circumstances, when cysts exist, the accidental occurrence of an acute inflammatory reaction within that cyst appears to be capable of "breaking down" the cystic structure to the extent that healing of the periapical lesion will occur without apicoectomy. An instance of this is shown in Figure 2.

The patient was a 21 year old girl. Routine roentgenographic examination revealed a cystic region associated with the upper right central and lateral incisors. The patient was directed to an oral surgeon for removal of the cyst and the teeth with which it was associated. An attempt was made at the time of the oral surgery to aspirate the cyst before it was removed. During the procedure the cystic region became infected. The acute phase of this infection was brought under control with intramuscular injections of penicillin while drainage was established through the teeth. After the acute inflammatory reaction subsided,

polyantibiotic paste was sealed in the root canals. On evidence that the root canals were disinfected, routine filling procedures were instigated. Figure 2, right, taken approximately ten months after the beginning of treatment, indicates almost complete healing of the periapical region.

Instrumentation of the Canal • One of the most important steps in good root canal therapy is the complete débridement of the canal.[4] Complete details on this facet of treatment are beyond the scope of this paper but it can be pointed out that gross débridement should first be effected with barbed broaches of varying sizes while the enlargement of the canal is accomplished with reamers. Planing and smoothing the walls of the canal with appropriate files completes the procedure.

After the establishment of a path with the pathfinder, initial débridement should be undertaken with extremely small instruments. Care should be exercised to free the canal of pulp nodules and other calcareous deposits before larger instruments are introduced. In order to improve the prognosis, as much affected dentin should be removed with reamers as is practical. Where root canal instrumentation is incomplete, subsequent steps in treatment, including disinfection and filling, may be more complicated and difficult.

Process of Disinfection • The use of the rubber dam has long been established as a fundamental part of any operation designed to disinfect root canals. Moreover, existing restorations must be carefully evaluated. If it is suspected that they do not adequately seal the crown, they should be replaced or repaired before the process of disinfection is begun. When rubber dams are not adequately affixed to intact crowns at each step involving disinfection, as well as in all the steps which follow when disinfection has been achieved, failure is inevitable.

Through the years numerous drugs have been employed in the disinfection of root canals.[5, 6] In addition, direct heat treatment[7] and electrochemical[8] processes have been advocated. The greatest difficulty encountered with most disinfecting agents is that, if used in sufficient amounts or with sufficient intensity, they will penetrate the apex of the tooth which results in irritation or injury to the periapical tissues and many times will inhibit the

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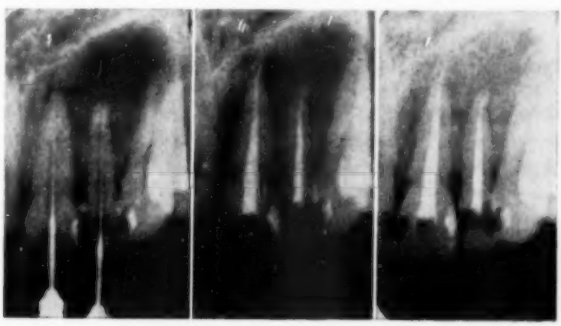

Fig. 2 • Left: Beginning of treatment; pathfinders in place. Center: Root canals filled. Right: Film taken approximately 10 months after beginning of treatment

healing processes desired at this point.[5, 9] It is almost impossible to maintain chemical solutions in the canal of the tooth without resultant penetration of the apex by them because of the free exchange of tissue fluids.

Most drugs used in root canal therapy have a common shortcoming; they fail to detoxify and neutralize the split proteins which inevitably are produced in the putrefactive process. Such drugs have no fixative properties, and consequently no action on the toxic products present. The same failing is, of course, true of the heat and electrochemical methods. There is reason to believe that much of the tissue destruction that takes place in the periapical region is due to these toxic products. When these substances are not inactivated in some way they remain and carry on their destructive work, perhaps for years. It is possible that in many instances destructive organisms have been eliminated, but their handiwork, in the form of these toxic by-products, has been allowed to remain.[10]

With the advent of the antibiotics it was thought that a method for controlling bacteria associated with necrotic pulps had presented itself, the use of which would not be accompanied by irritation to periapical tissues. This has proved true to a great extent. It has been noted, however, that when bacteria were destroyed with antibiotics, the fungi and yeasts multiplied in great numbers. None of the subsequent work with antibiotics indicated that these drugs had any effect on such growths. Moreover, most of the drugs employed to destroy fungi and yeasts are not compatible with the antibiotics when used in solution with them. In order to have a mixture capable of acting successfully against all bacteria, fungi and molds likely to be present in necrotic pulp tissue it was necessary to find an agent that could be used in conjunction with the antibiotics. Grossman[11] advanced the following formula which was designed to accomplish these objectives: potassium G penicillin, 1,000,000 units; bacitracin, 10,000 units; streptomycin calcium chloride complex, 1 Gm.; sodium caprylate, 1 Gm., and DC 200 silicone fluid, 20 centistokes, 3 cc.

It has been the clinical experience of the authors that this polyantibiotic mixture, judiciously used, will, in the majority of cases, disinfect necrotic pulps in one or two treatments. Up to the present time no cases have been encountered which have apparently failed to respond to this program.

Determination of the point in time when disinfection of the root canal has been achieved is an important consideration. The absence of any odor of putrefaction often is used as a guide. The presence of any such odor within the canal of course precludes the possibility that disinfection has been accomplished. Utilization of bacteriological cultures provides an adequate means of assaying the effectiveness of the drug employed in disinfection. The technic of culturing the contents of root canals cannot be described here. Acceptable procedures have been outlined in the literature[12] and they may be used to advantage. It might be pointed out that when polyantibiotic mixtures have been used any standard procedure for such cultures must be supplemented by "neutralization" of the antibiotics within the media employed.

The significance of the toxic by-products of protein degradation has been stressed. Since the antibiotics have no effect on such products, some step in the procedure of treatment for necrotic pulps must be included to insure their eradica-

9. Grossman, L. I. Irritating potentialities of root canal medicaments. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:564 Sept. 1944.

10. Evaluation of the effect of dental foci of infection on health. J.A.D.A. 42:615 June 1951.

11. Grossman, L. I. Polyantibiotic treatment of pulpless teeth. J.A.D.A. 43:265 Sept. 1951.

12. Coolidge, E. D. Endodontia; the clinical pathology and treatment of the dental pulp and pulpless tooth. Philadelphia, Lea & Febiger, 1950, p. 164-170.

tion. Consequently, after evidence that disinfection has been achieved, the pulp canal is routinely treated with silver nitrate. The fixative action of this drug detoxifies the injurious by-products of protein degradation in an irreversible chemical reaction. At the same time it seals the ends of the dentinal tubules comprising the wall of the canal. This "silver plating" action is in evidence roentgenographically as a radiopaque coating on the wall of the canal.

Filling the Canal • There is now, as in the past, much controversy regarding the best method and material to employ in filling or obliterating the canal.[1] Considerable attention has been given to filling the canal completely in its vertical dimension. On the other hand, comparatively little attention has been directed toward obliterating and sealing the canal in cross section as near the apex as possible (the treated area) and then repeating this procedure as many times as possible between the first seal and the coronal opening of the canal.

The material used for filling the canal ought to be nonabsorbable, contain no volatile constituent, and be absolutely impervious to moisture. Ordinary gutta-percha, set in sections as a "corking" medium, is the best material in use today. If used properly, it closely approaches fulfilling the criteria set for a good filling material.

Chlorapercha (gutta-percha dissolved in chloroform) has been widely employed as a filling material.[1] When viewed roentgenographically this material appears to fill the canal in its entirety, even down to the small auxiliary canals. When teeth whose canals have been so filled are extracted and examined microscopically, however, it is evident that the chloroform has evaporated, leaving the body of the filling material perforated with avenues which offer free access between the interior of the tooth and the periapical region. The same failing is characteristic of filling materials which are set with the aid of cement. At the present time, there is evidence to indicate that none of the cementing substances now available provide seals which are impervious to moisture.

SUMMARY

Cases should be selected carefully for root canal therapy on the basis of the following two fundamental criteria:

1. Patients should be physically well individuals since innate healing qualities are necessary to assist in a return to normal of the periapical tissues.
2. Teeth themselves should be readily operable and offer the probability of instrumentation throughout their entire length.

A complete and a thorough instrumentation enables the operator to fill the canal better because of the smoother walls and the optimum amount of working space.

Complete disinfection of the main canal and accessory canals must be achieved. This apparently can be done more rapidly with the polyantibiotic mixture described than with other drugs now commonly used for disinfection. Detoxification of the products of protein degradation should be considered an essential portion of this phase of treatment.

The root canal must be obliterated somewhere in the treated area, the material used being nonabsorbable, nonvolatile, and impervious to the action of moisture.

The American Dental Association program for community dental health

W. Philip Phair, D.D.S., M.P.H., Chicago

The American Dental Association long has urged a constructive approach to the dental health problems of this country through the development of community dental health programs. It has been recognized, through both tradition and experience, that it is in the community where health needs can best be determined, where resources can be utilized to the fullest extent, where the desires and interests of the people can be made known and, in the final analysis, where the actual health services are performed.

Probably the first community effort toward the improvement of dental health was the establishment of a dental clinic for the poor in New York City in 1791. Ever since that early beginning, dental societies at the local, state and national levels have been providing the leadership for the inauguration of community dental health programs. A survey conducted in 1950 by the Council on Dental Health of the American Dental Association indicated that there were at that time at least 5,000 United States communities conducting some type of organized dental health program.[1] To be sure, many of those counted in the survey hardly merit identification as dental health programs; but the very fact that they can be named at all indicates that in at least 5,000 communities in the United States, citizens are concerned with the need for improvement of dental health and are making an earnest attempt to do something about it.

FIVE THOUSAND PROGRAMS A MERE BEGINNING

The lack of a good definition of what constitutes a community makes it impossible to estimate the total number of communities in the United States; however, there are some 40,000 cities, towns and villages with a population of over 100 persons.[2] According to the American Dental Association survey, then, approximately 35,000 of these places lack any identifiable evidence of the type of program that has been recommended repeatedly by the American Dental Association and by practically every state dental society in the nation.

Five thousand dental health programs sounds like a tremendous amount of community effort. These programs tell a story of more that 5,000 hopes and 5,000 expectations and an undetermined number of successes and disappointments. Many of these programs are successfully promoting good dental health; yet in view of the enormity of the nation's dental health problems, the examples of successful dental health programs are altogether too few.

Presented before the Section on Public Health Dentistry combined with the Section on Pedodontics, ninety-third annual session, American Dental Association, St. Louis, September 10, 1952.

Assistant secretary, Council on Dental Health, American Dental Association.

1. Phair, W. P. Community dental health programs in the United States: results of a survey. J.A.D.A. 43:722 Dec. 1951.

2. Geographical handbook. Chicago, Rand McNally & Co., 1952, p. 4.

REASONS FOR FAILURE OF SOME PROGRAMS

The fact that the number of effective community dental health programs is small does not mean that the principles based on community initiative are unsound but rather that too little attention has been given to the methods by which community groups can organize and work effectively toward common goals. Some of the factors that determine the success or failure of a community dental health program were revealed in a three-year study that was completed recently in Columbia County, New York. The Council on Dental Health of the Dental Society of the State of New York reviewed the documentary report of the program at its meeting in May 1952 and learned that some of the most significant problems encountered in the development of the program were: (1) the local dentists' concern that some sort of a federal socialistic measure was being proposed, (2) an attitude of doubt on the part of the dentists as to the motives of their local and state health departments and (3) a lack of understanding and acceptance by individual dentists of the policies propounded by their state and national dental organizations.[3]

Although it is recognized that there are additional reasons for the failure of many dental health programs to begin or to become effective, the fact that some of the major blocks in their development lie within dental societies themselves should cause a serious examination of the reasons why these blocks exist.

Because it is the dental profession, more than any other one group, that has evidenced the greatest concern for the dental health status of the people of this country and because it is the dental profession that has given the major leadership toward a solution of the problem, it seems incredible that dentists themselves are contributing also to some of the major blocks to the development of community dental health programs. Why should there be such a striking incongruity?

Perhaps three of the principal reasons are these:

1. Failure of dental societies to communicate to the private practitioner a knowledge and an understanding of public health policies adopted by the American Dental Association and by the practitioner's own state dental organization.

2. Failure of the private practitioner and the public health worker to define, to their mutual satisfaction and understanding, the objectives of public health dentistry and the scope of activities that constitute a public dental health program.

3. Unfortunate experiences of dental societies with previous unsound proposals of health departments and dentists.

NEED FOR LOCAL PLANNING

The dental profession has a responsibility beyond that of formulating national and state policies; it must also provide for the continuing education of its members. Dentists need a better opportunity to learn how to understand and improve the relationships between their private practice and the total health of the community in which they serve. Public health teaching in most dental schools is pitifully inadequate, however, and very few dental society meetings are devoted to the public health programs in the community. How, then, can a dentist be expected to develop all at once a social consciousness and "know-how" when called on for assistance by community leaders? In view of this lack of understanding, it does not seem surprising that dentists are sometimes

3. Skinner, Mary Lou. The pilot study on health education for dental health. Report to the Council on Dental Health of the New York State Dental Society September 16, 1949 - May 7, 1952. Albany, N. Y., Bureau of Dental Health, New York State Health Department, 1952.

suspicious of the motives of public health workers.

Because American Dental Association and state policies are guides, not directives, the problem is not how to impose these national policies on the community but how to help communities develop program plans for themselves. The workshop, or conference, has been found to be a successful method whereby state dental societies have studied the dental health problems in their respective states and have made recommendations for their solution. In several states these conferences have become an annual affair, and in a few instances conferences have been held at the local level. It is significant, however, that dental societies have not begun to realize the potential benefits that could result from the workshop type of conference at the local level.

The leadership for these conferences must come from state dental societies and dental directors of state health departments. This leadership will be enhanced if future dentists, now in dental schools, are given practical courses that will help them to appreciate better the social responsibilities of the dental profession.

DEFINITION OF PUBLIC HEALTH DENTISTRY

The second difficulty has to do with the confusion in the minds of many dentists as to what constitutes public health. Dentistry is relatively new in the public health field; and public health methods used in combating dental disease are not yet as clearly defined and uncontroversial as are many public health procedures, such as pasteurization of milk, water purification, tuberculosis control and the services provided by public health nurses. The time has come, however, when some kind of a working definition of public health dentistry must be formulated.

Close cooperation is essential between private dentists and public health workers. This cooperation is helped by a differentiation of the fields of responsibility. If there is a distinction between private practice and public health and if there is a distinction between public health and so-called "socialized medicine," the respective field of each should be clearly defined.

A working definition of public health dentistry was formulated by the Council on Dental Health of the American Dental Association during a conference in April 1952, in which the Council had the assistance of representatives of the American Association of Public Health Dentists, the Association of State and Territorial Dental Directors and the U. S. Public Health Service. The following definition was adopted by the House of Delegates of the Association at its 1952 annual session:[4]

"For the purpose of this report . . ., public health is considered to be those organized community health services which cannot be rendered by the private practitioner alone."

This definition contains somewhat the same concept as that presented by Dr. William Shepard in his 1951 presidential address to the American Public Health Association, when he said:

> The dividing point, if we must have one, between public health and the private practice of medicine is that point at which a health problem in a given community is of sufficient interest to a sufficient number of citizens so that some type of community organization is required to solve it. Obviously, no single individual or physician can provide a city with a pure water supply, nor can he provide universal pasteurization of milk, nor proper waste disposal. These are community chores. All the doctors [of medicine] together cannot bring about smallpox and diphtheria immunization of 85 per cent of the child population, though the doctors can be of great help. It requires community organization, best led by the health officer.[5]

4. Transactions of the American Dental Association, 1952. Chicago, American Dental Association, 1952.

5. Shepard, W. P. Public health and "socialized medicine." Am. J. Pub. Health 41:1333 Nov. 1951.

The basic objectives of dental public health listed in the report are to promote:[4]

1. Oral health by placing emphasis on the prevention of disease and oral maldevelopment.
2. Development of methods for the early detection and the control of such conditions when they are not prevented.
3. Development of the knowledge and attitudes that will motivate the dental profession to practice, the local health officers and other officials to sponsor, and the public to accept these preventive and control technics.

The Council suggested also activities by which dental public health implements its purpose; these include:

1. Motivating people to seek adequate oral health care by providing to individuals and groups consultative and educational services in every area of oral health.
2. Assisting in the continued education of the dental profession in oral care through cooperation in refresher courses, such as in dental practice for children, in radiologic diagnosis, in orthodontic treatment, in treatment of periodontal disease, in the rehabilitation of patients with oral clefts, in the use of auxiliary personnel, in preventive measures or in other specialized knowledge.
3. Promoting and conducting studies to determine the extent of the oral health problem of a state or a community, conducting research on methods of meeting and reducing the oral health needs, and motivating the public and the dental profession to accept the results of such research.
4. Promoting the availability and utilization of laboratory diagnostic services, such as lactobacillus counts, Snyder tests, determination of fluoride concentration in water supplies, biopsy and bacterial examination, in order to assist in early detection or prevention of oral disease or to evaluate the progress of treatment.
5. Engaging in administrative research to develop more effective methods for achieving the objectives of dental public health.
6. Developing and testing new indexes for oral health appraisals, determining base lines for evaluation of dental public health programs and evaluating the oral health program periodically.
7. Developing standards for the efficient administration of the office of the dental health director in such activities as the preparation of budgets, office routines, personnel management, program planning, coordination of programs, participation in department staff meetings, preparation of reports, and development of scientific and functional education materials.

PUBLIC HEALTH AND DENTAL CARE

One exception in the list of basic activities of dental public health is the provision of dental care. The Council, in preparing its report to the House of Delegates, recognized that dental care is frequently regarded as a part of a public health program and that in many instances dental care is almost the only activity in the so-called dental public health program. Nevertheless, the Council regards dental care not as a basic public health service but rather as an expedient, temporarily imposed on public health administrators. It is generally recognized that the provision of corrective services is not a sound method of meeting the long-range objectives of public health.

The Council indicated that the development of better methods for getting people to the dentist is part of the responsibility of public health workers but that the actual provision of dental care constitutes the practice of dentistry, not the practice of public health.

Dr. E. G. McGavran, dean of the school of public health at the University of North Carolina, wrote recently in a draft of a definition of public health:

> We will work on individuals only for the purpose of community health, except as the community demands that we, as public servants, do medical care of individuals. We shall provide medical care under protest that it is not our function, not public health, and as soon as it can be assumed by those whose responsibility is individual health, we wish to be relieved of it.[6]

He explained further that the public health officer's responsibility is the "scientific diagnosis and treatment of the body

6. McGavran, E. G. Letter to Carl Buck, Sept. 11, 1951.

politic," as exemplified in the list of activities just cited. For example, a health officer may point out the need and assist in the development of such services as pasteurization of milk and fluoridation of public water supplies; but the actual provision of these services is the responsibility of other agencies in the community. Sometimes the community must assume responsibility for personal health services for certain people, but the provision of these services should not be classified as the practice of public health.[7]

ASSOCIATION ACTIVITIES FOR COMMUNITY HEALTH

The American Dental Association program for dental health is directed almost entirely to the promotion of community dental health programs. The Association carries out its program indirectly through its leadership and the counsel it provides for state and local dental societies and other health personnel at the state and local levels and directly through its work with members of health and allied organizations at the national level.

Some of the Association activities that are directed toward better dental health in the community include the advocacy of strong dental units in state health departments, the support of local public health units, the recommendation of federal grant-in-aid funds for the development of community dental health programs, participation in health council work and assistance in conducting dental health workshops.

The American Dental Association has attached special significance to dental public health by making this field a specialty of dentistry and by giving it the status of a section at the annual session. The Association has constantly been raising the standards of dental education to the point where the dental profession in the United States is by far the best equipped in the world to provide dental health services. It has given leadership to the development of additional facilities for training dentists and dental hygienists, and is working toward better methods of training dentists in the more efficient use of auxiliary personnel.

The Association sponsors and promotes dental research at the National Institutes of Health, at the National Bureau of Standards and at other institutions; it explores controversial areas in dental health to determine "What is fact?"; it evaluates the results of scientific research and interprets these results to the profession and the public. It promotes the use of preventive measures, as is particularly evident in its support of fluoridation. It is recognized as the leader in the development of authentic dental health education materials, it sponsors National Children's Dental Health Day and in its newsletters and journals it provides a medium of exchange of dental health information throughout the nation.

These and many other activities indicate the profound interest of the American Dental Association in community dental health. It should be emphasized that the activities, policies and recommendations of the Association represent a program determined by the elected delegates of seven eighths of the dentists in the United States. Every dentist has an opportunity and a responsibility to have a part in the deliberations and actions of his national organization. In the final analysis, the program of the American Dental Association for community dental health becomes a reality only when the dentists in their own communities work with their own people in the development and maintenance of their own programs of action.

7. McGavran, E. G. Personal communications, Nov. 24, 1952, and Jan. 27, 1953.

Cases and Comments

SUBMERGED DECIDUOUS MOLARS

By Emmett M. Stanton, Jr., A.B.; Charles A. Sweet,† D.D.S., and Frederick T. West,‡ M.A., D.D.S., San Francisco*

A nine year old boy was referred to the pedodontia department of the College of Physicians and Surgeons on April 27, 1951 for diagnosis and treatment.

History • The medical history revealed that the patient had had measles and chickenpox at the age of seven. Influenza or colds occurred fairly constantly. The tonsils and adenoids had been removed. The child slept on his back as an infant and in varied positions in early childhood. An even-flow nipple was used for infant feeding with no pacifier. When the child was a year old, the deciduous teeth began to erupt. This was accompanied by fever, nausea and a running nose.

Clinical Examination • The general appearance of the patient was that of a precocious, excitable child. The gingiva was normal as was the frenum. The teeth appeared to be of average size but all deciduous molars were partially submerged. The second deciduous molar on the left side of the mandible and the second deciduous molars on both the right and left sides of the mandible were unerupted but roentgenograms disclosed their position in the alveolus (Fig. 1, left).

The submerged deciduous molars allowed the first permanent molars to drift and tip anteriorly. The patient exhibited a Class I malocclusion (Fig. 1, right). There was a fistula opening buccally in the soft tissue in the mandibular second deciduous molar region on the right side.

Roentgenographic Examination • The second deciduous molar on the right side of the mandible presented a moth-eaten appearance and was wedged between the first permanent molar and the first deciduous molar. The second deciduous molar on the left side of the mandible was wedged into position by the extreme mesial tilt of the first permanent molar. Although the maxillary deciduous molars on the right side were submerged, there was no spatial loss. The maxillary second deciduous molar on the left side was wedged in place by the mesial migration of the maxillary first permanent molar.

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†Director, postgraduate education, College of Physicians and Surgeons.

‡Clinical professor of orthodontics, College of Physicians and Surgeons.

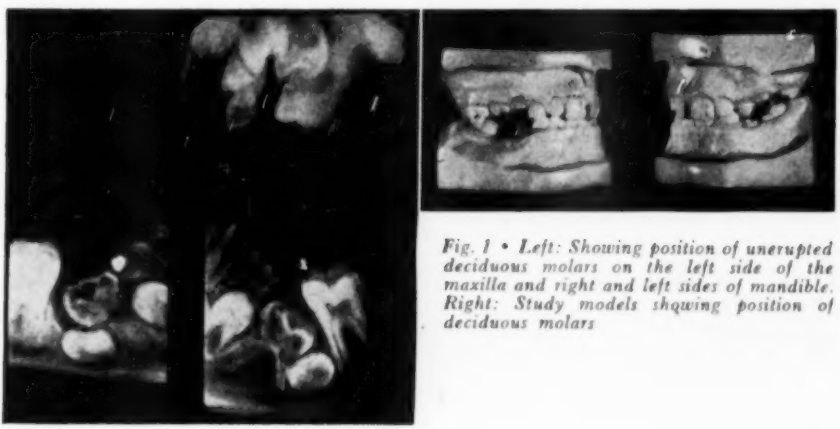


Fig. 1 • Left: Showing position of unerupted deciduous molars on the left side of the maxilla and right and left sides of mandible. Right: Study models showing position of deciduous molars

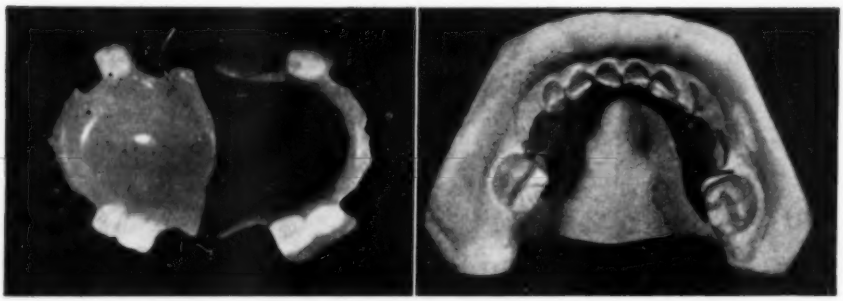


Fig. 2 • Left: Acrylic resin stay plate used initially to obtain space on the right and left sides of the mandible. Right: Mandibular stay plate used to obtain additional space on the left side and to maintain space on the right side. The maxillary stay plate was used throughout treatment

Study model measurements showed that the permanent molars would have to be uprighted and moved posteriorly so as to allow sufficient space for surgical removal of the unerupted deciduous molars and the eruption of the second bicuspids. The molar on the right side of the mandible required 2.5 mm. movement; the molar on the left side, 7.5 mm.; the molar on the left side of the maxilla, 3 mm.

Laboratory Findings • Laboratory findings were essentially normal except for a lowered metabolic rate for which the child was receiving thyroid therapy.

Treatment • Treatment was begun May 25, 1951. Acrylic resin stay plates with kick-back wires (Fig. 2) were inserted to exert pressure and open the spaces between the first deciduous

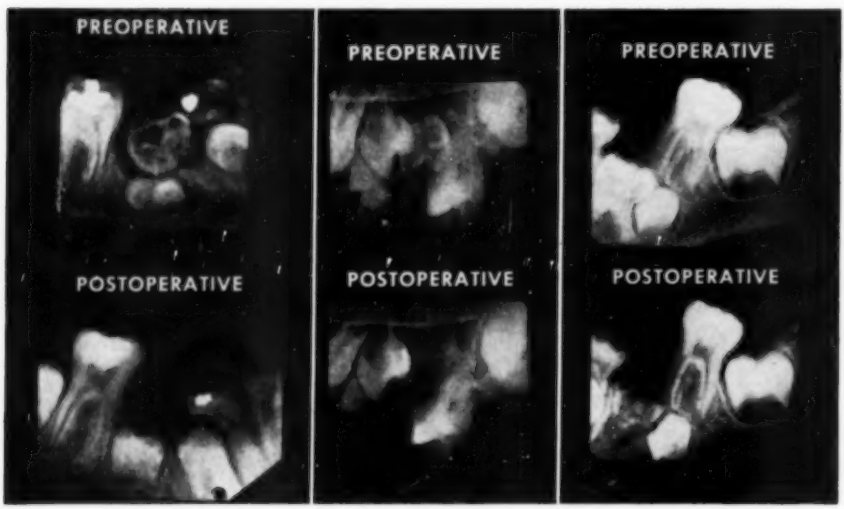


Fig. 3 • Left: Roentgenograms of right side of mandible. Center: Left side of maxilla. Right: Left side of mandible

molars and the permanent molars. These kickback wires were adjusted weekly until July 11. By that time sufficient space had been obtained on the right side of the mandible to allow removal of the second deciduous molar (Fig. 3, left). Pentobarbital sodium and a local anesthetic were used. A new mandibular space maintainer was constructed September 25 to facilitate further uprighting of the first permanent molar on the left side of the mandible. By November 21 sufficient space had been obtained in the maxilla and the left first and second deciduous molars were removed surgically using premedication and a local anesthetic (Fig. 3, center). The second deciduous molar on the left side of the mandible was removed January 15, 1952, using premedication and a local anesthetic (Fig. 3, right). The position of the permanent molars will be maintained by means of acrylic resin stay plates until such time as the second bicuspids erupt.

Summary • Three submerged deciduous molars in a nine year old child were locked in position by the first permanent molars. Early diagnosis, coupled with medical therapy and the use of simple acrylic resin appliances with auxiliary wires, helped to reposition the permanent molars. This repositioning allowed the surgical removal of the unerupted second deciduous molars and there was no injury to the permanent teeth and little traumatic discomfort for the patient.

TECHNIC FOR ENLARGING A ROOT CANAL

By I. Gerson, D.M.D., D.D.S., Brookline, Mass.

The following is a practical method for enlarging a root canal in preparation for a post for a Richmond crown. This method eliminates the danger of perforation.

With a hot pointed instrument, the guttapercha filling in the root canal is softened and removed to a depth of 2 or 3 mm. This will allow a no. 3 or no. 4 root canal broach to be held firmly in the canal. The protruding end of the broach is used as a guide to indicate the direction of the root canal. A no. 2 round bur on a straight handpiece is placed parallel and as close as possible to the broach in the root canal. The assistant removes the broach from the canal so that the operator will not move the bur from its position.

After a few millimeters have been drilled gently, the procedure is repeated, the broach again being inserted and the bur placed parallel to it.

The size of the bur is increased gradually and the entire process is repeated until the required depth is reached.

It is possible to use this method in any tooth, even when a badly broken down molar or bicuspid is to be reinforced.

21 Elba Street

GENETIC DYSHARMONY IN JAW RELATIONSHIPS

By Genevieve Roth, D.D.S., asst. professor of periodontology and pharmacology, University of Kansas City, School of Dentistry, Kansas City, Mo.

The patient was brought into the dental clinic by a student who had observed his unusual occlusion. The patient was a healthy 37 year old man. He was short, stocky in build and showed no obvious deviation in jaw and face relationship (Fig. 1).

On oral examination it was found that there were no missing teeth in either arch. There were seven small amalgam fillings in place, one full gold crown on the lower right second bicuspid and no new carious lesions. The supporting structure showed no significant periodontal pathosis. Roentgenograms disclosed no abnormality in bone structure. Bilateral spacings of 10 mm. each were evident between the first and second mandibular bicuspids. Both second bicuspids had rotated

Figure 1

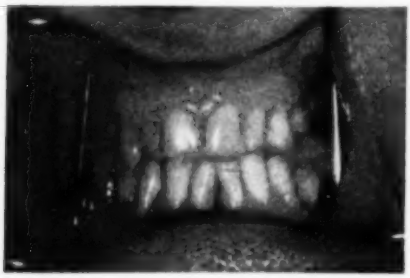


Figure 2

Figure 3

lingually 90 degrees. There were no third molars. The mandibular molars were tilted lingually.

The maxillary teeth could be entirely enclosed by the mandibular dentition, and the mandible in its anterior excursion was able to swing forward, encountering no interference from the teeth, to be stopped only by contact of the maxillary teeth and the floor of the mouth. Abrasions on the teeth cusps suggested that several intermediate chewing positions were possible with an end-to-end bite on the anterior teeth in the retruded position of the mandible (Fig. 2).

Lateral skull roentgenograms (Fig. 3) showed a normal sella turcica. The hands of the patient were normal in size and the spine showed no evidence of kyphosis. There was no overgrowth of long bones of the body. The diagnosis was possible genetic dysharmony in jaw relationship.

COUNCIL ON DENTAL MUSEUM AND REGISTRY

Loan material on oral pathology available from the Armed Forces Institute of Pathology and the Registry of Oral Pathology

This report is published at the request of the Council on Dental Museum and Registry of the American Dental Association. This Council cooperates closely with the Armed Forces Institute of Pathology and the Registry of Oral Pathology which prepares and makes available to members of the dental profession pathological specimen case histories and pathological visual education material for educational and training purposes.

The following loan sets and other data are available for loan or purchase from the Armed Forces Institute of Pathology and the Registry of Oral Pathology in accordance with the regulations as indicated for each item:

KODACHROME LOAN SETS

These sets are in five categories and may be secured on a loan basis for a two week period at no charge and with no deposit. Only one set from each category may be requested at one time. Most of the slides are clinical photographs in color. Occasional roentgenograms, gross photographs and photomicrographs are included.

Mouth Diseases • This set includes most superficial oral lesions such as leukoplakia and lichen planus together with many inflammatory and allergic reactions. It consists of 95 slides and five sets are available for issue.

Benign and Malignant Tumors • Included in this set are most benign and malignant oral tumors, excluding those associated with the odontogenic apparatus. It consists of 100 slides and five sets are available for issue.

Anomalies, Odontogenic Tumors and Cysts • This set includes examples of all odontogenic tumors and cysts of the oral regions, also most anomalies of the teeth relating to their size, shape and development. It consists of 100 slides and five sets are available for issue.

Gingival and Periodontal Lesions • This set includes examples of most forms of gingivitis, periodontitis and periodontosis. It consists of 64 slides and five sets are available for issue.

Oral Manifestations of Systemic Disease • This set includes examples of lesions related to dietary deficiencies, specific infections such as tuberculosis and syphilis,

as well as the blood dyscrasias. It consists of 95 slides and five sets are available for issue.

MICROSCOPIC LOAN SETS

These sets are in two categories. All slides are microscopic sections. Complete case histories and a résumé of the important changes to be seen histologically are recorded in a syllabus which accompanies each set. The sets may be secured on a loan basis for a two week period at no charge and with no deposit.

Oral Pathology Loan Set—Microscopic—Small • This set covers most of the tumors and other diseases which affect the oral regions. Periodontal pathology is included. It consists of 50 slides and 50 sets are available for issue.

Oral Pathology Loan Set—Microscopic—Large • In addition to the subject matter contained in the small microscopic loan set, there are rare and unusual tumors and lesions of the oral regions. This is a rather complete coverage of oral pathology. Each set consists of 100 slides and 100 sets are available for issue.

OTHER DATA AVAILABLE

Atlas of Dental and Oral Pathology • This *Atlas* by Joseph L. Bernier and J. E. Ash was prepared from material in the files of the Armed Forces Institute of Pathology and the Registry of Oral Pathology; 230 pages and 484 illustrations; ed. 4, price $7.

PROCEDURE FOR OBTAINING LOAN SETS AND ATLASES

1. All Kodachrome loan sets may be borrowed by writing:

Colonel Joseph L. Bernier, DC, USA
Chief Oral Pathology Section
Armed Forces Institute of Pathology
7th St. and Independence Ave., S.W.
Washington 25, D. C.

2. All microscopic loan sets and the *Atlas* may be obtained by writing:

The Scientific Director
American Registry of Pathology
Armed Forces Institute of Pathology
7th St. and Independence Ave., S.W.
Washington 25, D. C.

3. All requests for loan material will be filled in the order received.

4. List alternative sets desired in the event the one you request is not available.

5. In all instances allow at least two weeks for delivery of the set.

6. Please bear in mind that the Kodachrome loan sets are limited in number and that the demand for their loan is very heavy. Because of this it may be impossible, on occasion, to supply these sets when the borrower indicates a definite delivery date. To minimize this possibility it is well to forward your request at least one month ahead of the date it is required for use.

7. In the case of the Kodachrome loan sets, only one from each category may be requested at any one time. Sets may, however, be ordered in advance for delivery at a later date.

COUNCIL ON DENTAL HEALTH

Proposal to subordinate administrative status of state health department dental units protested

The American Public Health Association is considering a proposal that will be detrimental to public health dentistry and to the development of dental health programs. The proposal is contained in a statement, "The State Health Department—Services and Responsibilities," published by the A.P.H.A. Committee on Administrative Practice in the November 1952 issue of the *American Journal of Public Health.*

The terminology of the statement defines a "bureau" as a major unit of the state health department; a "division" as a subunit within the "bureau," and a "section" as a subunit of the "division." Dentistry was relegated to division status in the "Bureau of Preventive Health Services," along with communicable disease control, maternal and child health and mental health.

The subordinate administrative status assigned to the dental unit has been protested by the Council in the following statement sent to the A.P.H.A.:

The Council on Dental Health of the American Dental Association has reviewed the draft of a proposed official statement of the American Public Health Association, entitled *The State Health Department—Services and Responsibilities.* The draft was submitted by the Committee on Administrative Practice and was published in the November 1952 issue of the *American Journal of Public Health,* pages 1450-1456.

For many years, the dental profession has urged the establishment of dental units in state health departments and has provided considerable leadership in the promotion of public health in states and communities. It is with concern that the Council on Dental Health now views the narrow concept of the scope of dental public health apparently held by the Committee on Administrative Practice and the subordinate administrative status the Committee has assigned to the dental unit in the state health department.

Recently, the House of Delegates of the American Dental Association adopted a comprehensive statement outlining the objectives and activities of dental public health programs. A copy of this statement and other materials setting forth the Association's policies and recommendations in regard to dental public health are attached. It is hoped that these materials and comments will encourage and assist the Committee on Administrative Practice of the American Public Health Association in revising its statement regarding the scope of a dental unit of a health department. It is the further hope of the Council that the Committee will give recognition to the fact that in many state health departments there is ample justification for a major "bureau" status for the dental unit. In all instances, the dental director should have (1) direct access to the state health officer on all matters of dental policy, (2) salary parity with other program directors, (3) parity with other professional people in attaining top echelon positions in the state health department and (4) an opportunity to take part in major planning activities through participation in staff meetings.

The proposed statement of the Committee on Administrative Practice constitutes a denial of the voluminous statistical evidence of the prevalence of dental disease; its serious physical, mental and social implications, and the presently available methods of prevention and control as utilized and directed by highly skilled and specialized dental personnel. The health and welfare of the public demand the maximum utilization of all resources available to the health department. This utilization can be attained only through a sound and equitable organizational structure.

The fact that dental public health involves a highly specialized area in the field of public health has been repeatedly emphasized. Dentistry, as one of the health professions, has developed autonomously in relation to the medical profession and enjoys the distinction of professional independence by virtue of educational requirements, organization and legal sanction—a privilege that guarantees full equality with the specialties of medicine in any administrative plan and is not to be confused with the status of groups and individuals in health department organizations whose entire activities are subordinate to those of the medical profession.

Accepted principles of organization, generally respected and practiced in both business and professional organization, affirm a recognition of the human equation as a basic factor in organization. Thus it is undesirable for a specialist in one profession to supervise and to be responsible for the successful operation of another specialized field of activity.

Successful application of the principle of span of control which is designed to limit the number of subordinates directly responsible to an administrative officer, is dependent on such factors as training and experience, physical capacity and available time of the administrative officer. This principle does not appear to have been a major factor in the Committee's decision to place the dental unit in "division" status. Certainly, the principle of clear definition of lines of responsibility, whereby the dental director is in immediate communication with chiefs of other bureaus and with the director, in all major program planning, has been entirely neglected.

The American Dental Association recognizes the need for adequate state dental public health programs and has officially adopted the policy that "the administration of the dental program should be in the hands of a qualified dental officer who is directly responsible to the state health officer." The American Public Health Association has ignored this recommendation of the dental profession and has consistently advocated a subordinate administrative status for the dental unit. The proposed official statement, published by the Committee on Administrative Practice, is in direct conflict with the recommendations of the American Dental Association. During its annual session in 1950, the Association's House of Delegates adopted the resolution "that dentistry be made a basic health service in all official state and community health programs" and "that a qualified, full-time public health dentist, who will have complete parity with medical or other personnel who are directly responsible to the state health director, be employed to direct and administer state public health dental programs."

The growth of dental health activities of state health departments has been one of the striking developments of public health administration in recent years. In 1933, there were twelve state health departments with dental units in operation. By 1945, thirty-eight, or 74 per cent, had established separate dental divisions or bureaus. In 1951, the health departments in forty-six states, the District of Columbia and three territories maintained dental units with twenty-one directly responsible to the state health officer and twenty-five responsible to an intermediate

bureau or division. In only seventeen states did dentists receive salaries equal to physicians serving on comparable administrative levels, although dentists are automatically limited in advancement to levels below the higher echelon attained by physicians.

Recent actions in reducing the administrative status of dental units in health departments is not justified. These actions are in sharp contrast to the realistic attitudes that exist in those states in which favorable relationships between the dental bureau and other units now prevail.

An evaluation of the plan presented by the Committee on Administrative Practice would not be complete without due consideration of its long-range effects upon present and future dental health programs. Leadership depends upon ability, training and the opportunity to achieve rewards commensurate with competent effort. Denial of the opportunity of leadership, essential in public health programs, fosters discontent and inevitably results in poor morale—a situation which should not be tolerated in a health department. Effective program planning is made considerably more difficult when it is necessary to communicate with the chief administrator through intermediary officers.

It is difficult to employ qualified dental personnel to fill the vacancies in health departments at the present time. If the plan of the Committee on Administrative Practice is widely adopted it will be even more difficult in the future to attract young dentists and other dental personnel to a career in public health.

The Council on Dental Health of the American Dental Association believes that the proposed plan would create obstacles in the administration of dental health programs and would seriously interfere with the future development of dental units in health departments. The Council, therefore, suggests that the recommendations of the Association's House of Delegates, cited in this report, be incorporated into the statement on services and responsibilities of the state health department presently being considered by the A.P.H.A.

COUNCIL ON DENTAL RESEARCH

Product added to A.D.A. list of certified dental materials

Since the publication of the most recently revised List of Inlay Casting Waxes (published in February 1953), the following material which conforms to American Dental Association Specification No. 4 for Inlay Casting Waxes has been added.

CERTIFIED INLAY CASTING WAXES
(A.D.A. SPECIFICATION NO. 4)

Wax	*Manufacturer or distributor*
Taggart's Blue	Mizzy, Inc.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

For the year 1952, the Film Library reports that it increased its total film collection by over 100 per cent. It now has 69 individual titles and 246 prints, whereas it had a total of 32 titles and 108 prints in January 1952. Of the current titles, 53 are on technical and 16 on dental health subjects. These figures do not take into account several additional titles and prints which were ordered but not yet received at the time of this report.

The demand from dental societies indicated the need for an increase in the technical film collection. To meet this need, the library acquired several films on periodontics, operative dentistry, dental prosthetics and oral surgery. Additional films, however, are needed in orthodontics, pedodontics, and implant dentures. If any dental societies, dental schools, public health agencies, individual dentists or the Armed Forces have recently produced films or are in the process of producing films on these subjects, it will be appreciated if they communicate with the Film Library so that previews can be arranged.

The accompanying graph and table show the circulation of both technical and dental health films among professional and nonprofessional groups of borrowers. As can be seen, there has been greater use of films in the latter category. Immediately after the annual session, however, the use of films among professional groups increased considerably.

The film reviewed in this article was shown at the annual session of the Association in 1952 and is considered one of the best films in the field of exodontics. Since the number of prints of this title is limited, it is suggested that program chairmen of dental societies and study clubs plan their programs far enough in advance to insure availability.

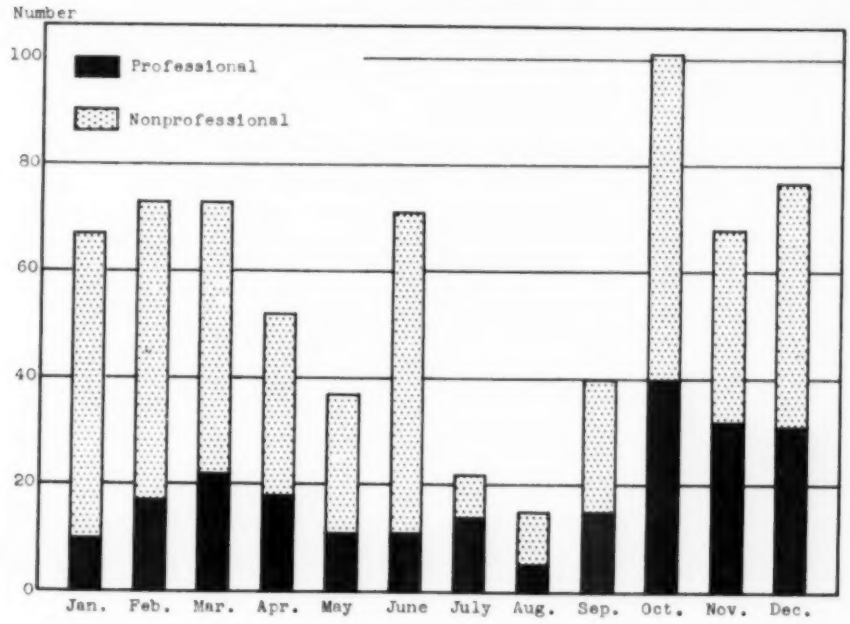
FILM REVIEW

Complicated Exodontia—Introduction • 16 mm., color, sound, 800 feet, 20 minutes. Pro-

Table • Circulation of films among professional and nonprofessional groups during 1952

Month	Professional				Nonprofessional						
	Dental societies	Dental schools	Study clubs	Total	Public schools	Public health services	Community&civic groups	Armed Forces	Foreign	Total	Grand total
Jan.	10	0	0	10	40	2	15	0	0	57	67
Feb.	14	3	0	17	45	1	9	1	0	56	73
March	15	7	0	22	43	1	7	0	0	51	73
April	12	6	0	18	16	4	14	0	0	34	52
May	4	6	1	11	20	1	2	3	0	26	37
June	11	0	0	11	25	1	32	1	1	60	71
July	8	4	2	14	0	4	2	2	0	8	22
Aug.	3	2	0	5	0	4	3	3	0	10	15
Sept.	8	1	6	15	7	5	11	0	2	25	40
Oct.	33	5	2	40	20	4	37	0	0	61	101
Nov.	23	7	2	32	13	0	23	0	0	36	68
Dec.	12	14	5	31	14	2	19	11	0	46	77
Total	153	55	18	226	243	29	174	21	3	470	696

Source: Records of the Film Library



Circulation of dental films during 1952 among professional and nonprofessional groups by the American Dental Association Film Library

duced in 1951 by the Department of the Navy, Bureau of Medicine and Surgery, Dental Corps, Washington, D. C. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago 11, and from the Department of the Navy, Bureau of Medicine and Surgery, Dental Corps, Washington 25, D. C. Procurable for purchase from the United World Films, Inc., 1445 Park Ave., New York.

This film illustrates the fundamental procedures involved in the successful removal of all teeth. Attention is focused on the use of forceps and surgery in those cases where forceps alone are not enough for proper extraction. The dentist is cautioned about the use of forceps since an understanding of the patient's ability to tolerate force is essential. Charts, diagrams and animation increase the instructional value of the film. It concludes with a summary of the basic principles underlying a proposed plan for treatment. This film is well organized, presented and photographed. It was awarded the 1951 Silver Award (first prize) for dental films at the International Exhibition of Cinematographic Art in Venice, Italy. It is a good teaching film for senior dental students, postgraduate dental students, general practitioners and oral surgeons. Its brevity makes it practicable for integration into a dental course. It is suitable program material for study clubs as well as dental societies.

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LON W. MORREY, D.D.S., EDITOR
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Public health dentistry endangered by proposal of special public health committee

A proposed official statement of the American Public Health Association, prepared by the committee on administrative practice of that organization and published in the November 1952 issue of its official journal,[1] contains recommendations of the committee regarding the services and responsibilities of state departments of health —including those for the services and status of state dental units. Should certain of the recommendations be put in effect the dental units of health departments would be relegated to an inferior position in the organization. And the director of the dental unit, instead of being directly responsible to the chief administrator, would report to an intermediary official. Thus the responsibility of administering state health department dental programs would be transferred eventually from dentists, trained in public health, to nondental administrators untrained in dentistry and, in some instances, wholly uninterested. This arrogation of authority and responsibility would be brought about by relegating the dental unit to the status of a division in a Bureau of Preventive Health Services along with communicable disease control, maternal and child health and mental health.

The Council on Dental Health of this Association, in a vigorous protest[2] to the American Public Health Association, points out that the recommendation of the committee on administrative practice

> . . . constitutes a denial of the voluminous statistical evidence of the prevalence of dental disease; its serious physical, mental and social implications and the presently available methods of prevention and control as utilized and directed by highly skilled and specialized personnel. The health and welfare of the public demand the maximum utilization of all resources available to the health department. This utilization can be attained only through a sound and equitable structure.

For more than a third of a century the dental profession has urged the establishment of dental units in state health departments for the purpose of developing effective programs to prevent and control dental disease. For full half a century dentistry has provided leadership in public health matters. Through those years the profession has watched with gratification society's acceptance of the premise that dental disease has public health implications. It has watched with interest the establishment of dental health units to the point where 46 states, the District of Columbia and three territories now have such agencies in their departments of health. It has watched with pride the growing accomplishments of these agencies and the initiative, enthusiasm, resourcefulness and drive of their directors. Now the profession watches with concern the efforts of some to halter this progress. It views darkly the possibility that the narrow concept held by a few transient health authorities regarding the scope of public dental health may jeopardize, even slightly, the public dental health efforts of half a century.

Too much has been accomplished in the field of public health and preventive dentistry for the dental profession or this Association to accept without protest the secondary position recommended by a committee of sixteen public health authorities, only one of whom has a dental degree. Twelve of the committeemen have medical degrees—a fact which might be construed to indicate that a supreme ignorance of dentistry, its problems, science and technics, is a fundamental requirement of those who would administer its public health affairs and control the funds and personnel provided for that purpose.

The recommendations of the committee on administrative practice of the A.P.H.A., as they now stand, are in direct conflict with the recommendations of the American Dental Association[3] which state that "each of the states should be urged to establish a division of dental health within the department of health, and the administration of the dental program should be in the hands of a qualified dental officer who is directly responsible to the state health officer." Dentistry must voice its objections so strongly to the recommendations of the committee on administrative practice that the Governing Council of the American Public Health Association will insist that they be recast along saner lines in the best interest of the public's health or the dental profession will seek the necessary legislative correction to protect the dental health of the public.

1. The state health department—services and responsibilities. Am. J. Pub. Health 42:1450 Nov. 1952.
2. Page 449 of this issue.
3. Report of the Council on Dental Health. Transactions of the American Dental Association, ninety-third session, 1952, p. 182.

Phenomenal growth in population taxes facilities of the country's dental schools

The *Dental Students' Register* for 1952-1953, recently issued by the Council on Dental Education, indicates that approximately 3,050 dentists will be graduated by the schools of this country in 1953, slightly more than were graduated last year, indicating that a steady increase in the production of dental manpower still is continuing. This

figure is important as it measures the adequacy with which increased demands for dentistry in the United States are being met by the source of supply—the dental schools.

Complaint is heard on all sides that the demand for dental services far outruns the supply. One important but frequently overlooked reason for this increased demand is the phenomenal growth of the nation. The present total population of this country is approximately 158,000,000, an increase of some 5,000,000 since 1950. This growth of population—manifest in all sections of the country—is estimated to be going forward at the rate of from 12 to 33 per cent for the decade in the fastest growing regions. Adequate dentistry for this expanded population can be furnished only by proportionate augmentation in the number of dentists. Last year's 2,975 graduates, when allowance is made for retirement and for death of practitioners during the same period, added about 1,200 to the total number of dental practitioners.

Since 1950 the number of young men and women entering the profession annually has been increasing gradually, but there is reason to believe that the schools have about reached their capacity unless they resort to so-called accelerated programs or other devices. Such expedients, though perhaps necessitated by the exigencies of war, cannot work satisfactorily as a routine long-term procedure. Since 1930, the number of dental schools has remained about stationary, increasing from 38 to 42. Three of these schools have been established since 1946. Two of them graduated 109 dentists in 1952 whereas the third, founded in 1950, has not as yet added any numbers to the profession. One new school is scheduled to open in the fall of 1953 and another in the fall of 1954. Each will be able to accommodate classes of 40 to 45 students. The number of graduates from the schools in 1952 varied from 12 to 148, with an average of 72 graduates per institution. Although the number of dental schools has remained fairly constant during the past 20 years, the number of students graduated annually has expanded from 1,561 in 1930 to 2,975 in 1952, an increase of 90 per cent.

If it were thought desirable to augment the profession at present by 1,000 more dentists a year—a modest goal—it would be necessary to increase the present total enrollment of students from 12,370 to about 16,500 and to expand the facilities of the schools by about 33 per cent. Or, as an alternative, to accomplish the same purpose, 14 new dental schools similar in size to those now operating would be required. It is more than doubtful that either of these expedients is practicable. Although qualified applicants for dental education might be available, dental teachers in sufficient number could not be secured at the present incommensurate salaries which dental schools can pay; and funds for building new schools and for instruction are not known to be procurable from university moneys or from private sources.

The complete solution of this problem is not foreseeable in the immediate future. But somewhat less than total solution is attainable. Research may be expected ultimately to relieve the pressure on dental practice. Unfortunately, despite scientific evidence presented by the dental profession, the ill effects of dental disease, until very recently, have failed to elicit sufficient general interest to stimulate the appropriation of much more than token funds by private and public agencies for dental research. Appropriation of funds for the fluoridation of drinking water—even though the amount is meager in comparison to the benefits derived—is significant in that it points the way which must be followed if a solution to society's dental problem is to be reached.

It must be recognized that the full effects of fluoridation and other preventive measures yet to be disclosed by research will be felt only a decade or so later and

even then will fail to stem completely the tide of dental need. In the meantime the public should recognize that in periods of rapid change in population such as these, maladjustments in the supply of dentists and dental education take place just as do maladjustments in the supply of labor and commodities. Failure to maintain or to improve the ratio of dentists to population is not due to stiff-necked bigotry on the part of dental educators nor to greed and self-interest on the part of dentists. The problem is not nearly so simple—nor is its solution.

Over the top — Relief Fund makes history

The annual goal of $100,000 for the Relief Fund at last has been reached as reported on page 460 of this issue.

For forty years, exactly, these pages of THE JOURNAL have been used annually to urge members to contribute to the Relief Fund program. For the past five years the appeals have been more pointed. The paragraphs have pleaded, demanded, scolded —and even tongue-lashed—members to unbutton their purses and dental societies to meet their quotas so that the $100,000 goal set annually might be reached and the needs of worthy destitute dentists more nearly met.

This year, on the seventeenth day of March, for the first time in the history of the Fund, contributions have soared to more than $100,000 and 32 constituent societies have more than reached their quotas.

It is with a deep feeling of satisfaction that THE JOURNAL can use these pages this month, not to prod, but to praise members and friends of the Association for their fine cooperation in behalf of the steadily growing number of once active members who must rely on the Fund for existence.

Washington News Letter

A flurry of bills introduced in recent weeks indicates that the new Republican Congress is as much concerned with national health legislation as was its Democratic predecessor in the Truman regime. Although Senator Taft and other majority leaders have expressed hope for adjournment by July 4, House and Senate members are sponsoring numerous bills relating to dental and medical care on the supposition that they will receive attention in next year's session of the 83rd Congress.

Objectives of their proposals include subsidization of dental education, full deductibility—for income tax purposes—of expenditures for dental and medical care, Federal aid to voluntary, nonprofit plans that would enable them to expand benefits for dental and medical services, financial support of local public health agencies and a five-year extension of the Hill-Burton hospital construction program now due to expire in June, 1955.

THE EISENHOWER HEALTH PROGRAM

Up to the middle of March, the White House had shown no sign of requesting Congress to enact any new health programs. However, President Eisenhower's elevation of the Federal Security Agency to a Department of Health, Education and Welfare presages action on his part in the medico-economic field, Washington observers believe.

They point out that deep significance attaches to a portion of the remarks which President Eisenhower delivered at the American Medical Association's special meeting March 14 in Washington. Although little public notice was taken of the following, it shows that the Chief Executive must have been dropping a hint when he said:

"We are determined to meet the requirements of our population in the services that only you (physicians) can provide."

The above statement, coupled with election campaign concern which Eisenhower displayed in the matter of rising cost of health services, may possibly be a forerunner of a relief plan in this direction. Not, of course, a system of national compulsory health insurance, which the President has repudiated many times over. But perhaps a plan whereby the Federal government would give financial aid to voluntary, nonprofit organizations which provide health services or—like Blue Shield and Blue Cross—write prepaid insurance to cover the cost.

This type of approach is the theme of the Ives-Flanders-Javits-Hale bill which was introduced in the Senate and House early in March. It is significant that all four sponsors are Republicans and staunch supporters of President Eisenhower.

VETERANS ADMINISTRATION

Although decisive action on national health legislation may not come in 1953 on Capitol Hill, the chances are better than ever that Congress may do something soon about the Veterans Administration—in particular, it may overhaul the VA's health care practices. At least, that is the goal of a special investigation now being conducted by the House Committee on Veterans' Affairs. The committee is scrutinizing every aspect of inpatient and outpatient service and has given particular attention to the so-called "home town care" programs in which private practitioners participate on a fee basis.

John Fauber, assistant chief medical director of VA in charge of dental services, was called before the committee a few weeks ago to present a detailed report on outpatient dental care since its inception in July, 1946. Here are some of the highlights of his summary:

Up to January 31, 1953, veterans had made more than five million applications for outpatient dental treatment. The care given had an estimated value of 260 million dollars, with 84 per cent being handled by private dentists on a fee basis.

VA estimates number of veterans eligible to receive outpatient dental care (limited to service-connected disability) at a minimum of eleven million and a maximum of sixteen million. The number is increasing at the rate of a million a year.

At the end of January, 1953 the backlog of unprocessed applications exceeded 300,000 and, because of a shortage of appropriations, this backlog is expected to be more than 400,000.

"The current program is admittedly expensive," said Dr. Fauber, "but if the veteran is to receive effective dental care as presently authorized by law, there is no cheap way out. The cost per patient will increase as time goes

on, and the only way that Congress can reduce the cost of the program without denying the veteran his legal due is to reduce the program's scope.

"The decision is up to Congress. Either Congress must provide generous funds for the outpatient dental program as it now stands, or Congress must amend the program to the point where it is less generous to the veteran."

SUPREME COURT RULING ON ORLOFF

Physicians, dentists and veterinarians inducted into the Army under Public Law 779 must be utilized in their professional capacities—even though they are in enlisted ranks—but the military is given wide latitude as to the definition of professional utilization.

That, in substance, is what the U. S. Supreme Court ruled on March 9 when it rejected, by a 6-3 vote, the appeal of a drafted physician that he be discharged or given a commission. The decision is expected to result in termination of several other court contests against the dentists-physicians draft law, although it does not preclude further litigation as to the law's constitutionality. This was not an issue in the case of Stanley J. Orloff, whose case was decided by the high tribunal.

It held that so long as the inductee is assigned to duties generally within his professional field, even though certain restrictions are imposed, the law is being complied with. (Dr. Orloff had protested that he was being used more as a technician than as a physician.)

DATA ON NATION'S HEALTH NEEDS

Published in mid-March by the Government Printing Office was Volume II of "Building America's Health," which contains documentary data on health needs and resources compiled by the Magnuson Commission under former President Truman. Chapters of the 320-page report are devoted to incidence of dental disease, training of dentists and provision of comprehensive health services.

The contents of Volume II are based upon testimony taken by the Commission at 32 panel meetings held in 1952, together with reference material collected by its technical staff. One of the panel sessions was devoted exclusively to dental problems and was held in Washington on July 15, 1952. Its keynoter was John C. Brauer, dean of the School of Dentistry, University of North Carolina.

Association Affairs

$100,000 GOAL ACHIEVED IN RELIEF FUND DRIVE

Contributions to the 1953 Relief Fund drive have reached the goal of $100,000 for the first time since the Fund was founded, it was announced March 17 by Leo W. Kremer of Fort Lauderdale, Fla., chairman of the Council on Relief.

On that date the total of contributions was $100,030.49 and 32 constituent societies had reached or exceeded their quotas.

Constituent societies which achieved their goals since the last issue of THE JOURNAL include: Arizona, California, Delaware, Illinois, Michigan, Missouri, North Carolina, South Dakota and Tennessee.

Those which had previously contributed more than their quotas are Alabama, Alaska, Arkansas, Southern California, District of Columbia, Florida, Georgia, Hawaii, Idaho, Indiana, Kentucky, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Oklahoma, Oregon, Washington, West Virginia and Wyoming.

As of March 17 contributions by constituent societies were as follows:

	1952-1953 Quotas	Contributions to March 17	Pct.
Air Force	$ 560.00	$ 522.50	93.3
Alabama	770.00	2,001.39	259.9
Alaska	50.00	150.00	300.0
Arizona	270.00	500.00	185.2
Arkansas	530.00	634.65	119.7
Army	540.00	436.22	80.8
California	3,620.00	3,679.50	101.6
California, So.	4,460.00	7,779.40	174.4
Colorado	960.00	908.00	94.6
Connecticut	1,950.00	1,854.00	95.1
Delaware	150.00	152.00	101.3
Dist. of Col.	860.00	1,376.00	160.0
Florida	1,220.00	1,470.00	120.5
Georgia	1,070.00	1,121.00	104.8
Hawaii	370.00	470.00	127.0
Idaho	260.00	456.00	175.4
Illinois	7,570.00	7,586.50	100.2
Indiana	2,240.00	2,498.00	111.5
Iowa	1,880.00	1,581.00	84.1
Kansas	990.00	984.96	99.5
Kentucky	1,080.00	1,413.50	130.9
Louisiana	990.00	954.60	96.4
Maine	450.00	352.00	78.2
Maryland	1,080.00	1,044.00	96.7
Massachusetts	3,810.00	3,416.67	89.7
Michigan	3,990.00	4,125.65	103.4
Minnesota	2,970.00	2,762.50	93.0
Mississippi	520.00	499.70	96.1
Missouri	2,590.00	2,622.00	101.2
Montana	380.00	507.50	133.6
Navy	790.00	517.50	65.5
Nebraska	1,080.00	1,125.50	104.2
Nevada	100.00	108.50	108.5
N. Hampshire	290.00	335.50	115.7
New Jersey	4,140.00	4,957.60	119.7
New Mexico	220.00	257.50	117.0
New York	15,220.00	10,949.00	71.9
North Carolina	1,240.00	1,334.25	107.6
North Dakota	350.00	475.55	135.9
Ohio	4,970.00	4,758.30	95.7
Oklahoma	900.00	1,303.00	144.8
Oregon	1,180.00	1,296.00	109.8
Panama C. Z.	30.00	7.00	23.3
Pennsylvania	6,970.00	5,353.44	76.8
P. H. Service	270.00	157.00	58.1
Puerto Rico	190.00	134.99	71.0
Rhode Island	570.00	373.00	65.4
South Carolina	400.00	322.00	80.5
South Dakota	340.00	360.00	105.9
Tennessee	1,150.00	1,473.50	128.1
Texas	3,050.00	2,151.50	70.5
Utah	480.00	414.50	86.4
Vermont	190.00	156.50	82.4
Vet. Admin.	960.00	399.00	41.6
Virginia	1,140.00	1,027.50	90.1
Washington	1,780.00	2,075.00	116.6
West Virginia	720.00	800.50	111.2
Wisconsin	2,930.00	2,500.00	85.3
Wyoming	160.00	180.50	112.8
Seniors		834.62	
Miscellaneous		32.50	
Totals	$100,000.00	$100,030.49	100.0

DEFENSE DEPARTMENT'S DRAFT BILL, FOUNDATION FOR SUPPORT OF DENTAL EDUCATION APPROVED BY BOARD OF TRUSTEES

The extension of the dentists-physicians draft act, amendment of the health and accident insurance program and the establishment of a foundation to support dental education and research were matters of major interest to the Board of Trustees of the American Dental Association at its annual meeting February 27-28 in the Central Office.

DENTISTS DRAFT ACT

The Defense Department's proposal for a two-year dentists-physicians draft act with a maximum induction age of 51 years won the approval of the Association's Board of Trustees, provided that the $100 monthly equalization pay for dentists is retained, higher commissions are granted experienced dentists and deferments are granted essential dentists.

Agreeing to the necessity for military recruitment of health specialists, the Board suggested that the following points be included in "any statute which may require the induction or involuntary recall of dentists into the armed services":

1. The law should not be extended more than two years, that is, beyond June 30, 1955.

2. The present maximum age for the induction of dentists should be maintained at 51.

3. The national, state and local advisory committees to the Selective Service System should be retained and their authority in no way diminished. The Health Resources Advisory Committee should be given positive statutory authority with respect to insuring the exemption from military service of an adequate supply of health personnel to protect the health of the civilian population.

4. In determining assignments to a particular Priority, credit should be given for service with an allied government in World War II and for service in World War II prior to entering an ASTP or V-12 course.

5. Maximum required service should not be more than 24 months, and provision should be made for the release, after not more than 16 months of service, of those who served 12 months or more subsequent to December 7, 1941, in the Armed Forces of the United States or of a country allied with the United States, ASTP or V-12 service excluded.

6. Persons who served and are discharged after June 25, 1950, should be excluded from further service except in time of war or national emergency hereafter declared by the Congress, except where an individual has additional liability as a general registrant.

7. It should be possible, at the expiration of any period of active duty occurring after June 25, 1950, for any dentist who is not subject to the general draft law, to submit, and have accepted, his resignation from the armed services.

8. The $100 per month equalization pay for dentists should be retained.

9. Adequate provision should be made for the deferment of persons essential to the community or to the nation, and for those who are disabled or under severe personal hardship which would be aggravated by service.

10. Newly commissioned dentists should be assigned grades commensurate with their professional experience. Veterans recalled through Selective Service processes or as reserves, should be given higher rank than that held in World War II if justified by their subsequent professional experience.

11. Deferment from induction by Selective Service processes or as a reserve officer should be granted any member of the faculty of a dental school who cannot be replaced and whose induction would

have the effect of (a) diminishing the quality of instruction offered; (b) seriously affecting the administrative or research program of the institution; (c) diminishing the number of students who could be offered adequate courses of instruction.

A sufficient number of individuals at the college level also should be deferred in order to provide a reservoir for the procurement of future students in schools of dentistry, medicine, veterinary medicine and the like.

In mid-February the Department of Defense had submitted a proposed bill to interested health agencies, including the American Dental Association, "for discussion purposes." The agencies were requested to submit their views on the bill. At that time the Department of Defense indicated that the maximum age for induction of dentists and physicians could not be lowered from 51 years because of an inadequate supply of nonveteran dentists in the younger age groups.

PRESIDENT'S COMMISSION REPORT

The Board recorded its opposition to the inclusion of OASI beneficiaries in a federal health insurance program, as recently proposed by the President's Commission on the Health Needs of the Nation.

The government's inclusion of persons covered by OASI would make the program "an undesirable form of compulsory federal health insurance to which the Association has traditionally been opposed," the Board stated after studying a report from the Council on Dental Health concerning the recently-published recommendations of the President's Commission.

The general objectives set forth by the Commission, however, are in accord with principles held by the American Dental Association, the Board declared.

The extent to which the Association will support other recommendations of the President's Commission will depend on the legislation proposed to implement the recommendations, according to the Board's resolution.

VETERANS ADMINISTRATION FEES

The Veterans Administration will not consider granting fee revisions on the basis of changes in the cost-of-living index, it was reported by the Council on Federal Dental Services.

An inquiry on this matter was addressed to the VA by the Council as a result of a directive from the 1952 House of Delegates requesting that the Council assist any constituent society which asked for help in negotiating fee revisions with the VA.

The Council will continue to seek clarification of VA policies on the request of constituent societies. The Board also directed the Council to circulate again to all constituent societies information on the procedures under which the VA will consider revision of fee schedules at various state levels.

HEALTH AND ACCIDENT INSURANCE

About 6,600 more Association members must apply for coverage under the health and accident insurance program before impaired risks will be accepted on a national basis, the Council on Insurance reported. A concerted drive to enroll the required number will be made, the Board stated after deliberations with the Council.

In many states few additional applicants are needed to make up the 50 per cent membership which is required before impaired risks are considered eligible for coverage on a state basis, the Council reported.

Alaska, Arizona, Idaho, New Mexico and Panama have already reached their quota of applicants, thereby qualifying their impaired risks. In New York, New Jersey, California, Utah and Nevada,

this plan of accident and health insurance has been in effect for several years; the membership already enrolled in these states is counted toward the national quota of 50 per cent.

After lengthy conference the Board requested the Council on Insurance to take the following steps:

1. Request broker to inform all impaired risks that they have the right to reapply for coverage when plan is qualified in the individual state or in the Association nationally;
2. Publicize the fact that qualification of the program, by state and nation, is made on the basis of total applications, impaired and unimpaired;
3. Instruct Insurance Trustee to press for another enrolment as soon as possible and advise Board of Trustees at annual session;
4. Request broker to seek amendment of contract to permit members applying before age 65 to obtain coverage when plan is qualified even though he has then passed age 65.

FOUNDATION FOR THE SUPPORT OF DENTAL EDUCATION, RESEARCH

The establishment of a foundation to support dental education and research was endorsed by the Board of Trustees after lengthy discussion of the proposal advanced in the report of the president, Otto W. Brandhorst.

Contributions to the foundation could be made by interested persons, organizations and the dental trades, prior to taxes. The initial funds or the income from them could be used to support dental education and research, Dr. Brandhorst said.

Philip Blackerby of Ann Arbor, Mich., has been requested to draw up an outline of the organizational structure of such a foundation, with the necessary provisions to carry out its purposes.

CONFERENCE ON STANDARDS FOR CLINICAL STUDIES OF CARIES

A research conference to develop uniform standards and procedures in clinical studies of dental caries will be conducted jointly by the Council on Dental Health, the Council on Dental Research and the Council on Dental Therapeutics.

Plans for the conference were approved and an appropriation of $2,400 was allocated to the conference budget by the Board after the need for standardization of data in caries studies dealing with a limited number of subjects was stressed by the Councils in a joint report.

LIFE AND MALPRACTICE INSURANCE

The Board of Trustees requested that additional publicity be given to the fact that those participating in the Association's group life insurance program have the privilege of converting their policy to regular insurance without taking a physical examination.

Malpractice • The Council on Insurance also reported that hypnosis, when used as a method of bringing about anesthesia, may be considered as covered by professional liability policies unless it is specifically excluded.

The Board voted to suggest to constituent societies that they review their liability policies, keeping in mind especially (1) the potential need for increased coverage and (2) the possibility of comprehensive coverage within their states.

ADVERTISING, EXHIBIT STANDARDS

The following revised standards were approved for advertisements in Association publications and for exhibits at Association meetings:

Advertising and Exhibit Standards • Any product or service which is related to dentistry or to the activities of dental organizations is eligible for advertising and exhibit in publications and meetings of the American Dental Association under the following conditions.

In order that these standards for advertising and exhibit may contribute their full effectiveness to the promotion and protection of the public health, both the text of the advertising itself and the texts, methods and materials

used in the promotion of a product or service will be used as measures of eligibility for advertising and exhibit.

1. The advertising, exhibit or promotion of a product must not violate, or assist in violating, any dental practice act or other governmental regulation or statute.

2. The advertising, exhibit or promotion shall not relate to products or services which have been adjudged worthless, dangerous, unethical or of secret composition by official action of appropriate agencies or consultants of the American Dental Association.

3. The advertising, exhibit or promotion shall not include claims of a type which have been the subject of unfavorable decision by the Federal Trade Commission or the Food and Drug Administration.

4. The advertising, exhibit or promotion may not relate to a product which is considered for acceptance by the Council on Dental Therapeutics of the American Dental Association and which has not been classified or which has been placed in Class C or D by official action of that agency.

5. The advertising, exhibit or promotion may not designate that a dentist or physician is in any way connected with the product or service.

6. The advertising, exhibit or promotion used in other media must be consistent with the spirit and letter of these standards.

APPROPRIATIONS AND FINANCES

Film on Hazards of Roentgenography • A color and sound film showing the hazards which may be encountered by dentists in using roentgenographic machines will be made at the National Bureau of Standards with an appropriation of $2,500 voted by the Board of Trustees.

The allocation was made in response to a request from the Council on Dental Research, which stated that the operators of the 65,000 dental roentgenographic machines in the country are exposing themselves to the direct beam of their machines.

"The results are apparent at almost every dental meeting, where dentists are present with mild and severe burns, blood diseases and amputations—all caused by carelessness and ignorance in the use of roentgenology in dentistry," the Council's report added.

Children's Dental Health Day • A budget of $4,900 was appropriated for the printing and nationwide distribution of educational material on Children's Dental Health Day. During the months preceding the most recent observance, the Bureau of Public Information distributed 2,500 portfolios of basic materials and filled hundreds of requests for supplemental material; 100,000 posters were distributed by the Council on Dental Health.

Daily Bulletin • During the annual session next September in Cleveland, everyone in attendance will again receive a *Daily Bulletin* containing information such as the time and place of meetings, the latest actions of the House of Delegates, location of exhibits, nominations and other events. The sum of $1,550 was appropriated by the Board to cover the cost of printing and distributing four issues of the *Daily Bulletin*, September 28-October 1.

Other Appropriations • A budget request of $2,800 was granted to the Film Library for additional personnel and $10,878 was added to the budget of THE JOURNAL to pay for increased printing costs.

INTERNATIONAL MATTERS

Gift of American Dental Society of Argentina • The gift of the American Dental Society of the Argentine Republic, a sum of $408.77 received in 1942, will be placed in the Dental Officers' Memorial Fund. This fund is dedicated to the erection of a suitable memorial for all dental officers who gave their lives in the service of their country during World War I and World War II.

The action of the Board was in accordance with the wishes of the Argentine organization, as contained in a letter recently received from George French, a former officer of the organization which made the contribution.

Appointment of Dental Consultant to WHO Staff • The Board requested that the United States delegation to the 1953 session of the World Health Organization seek the appointment of a full-time dental consultant to the WHO staff.

The Fédération Dentaire Internationale recently also made this request, observing that international dental health could best be promoted by a permanent dental consultant who could integrate dental programs with health programs and who could act as a liaison between the Fédération and the WHO staff.

Fédération Dentaire Internationale • Four members of the Association will be appointed to serve without remuneration as Association representatives in the General Assembly of the Fédération Dentaire Internationale, which will meet in Oslo, July 26-August 1.

The Association, which is entitled to five delegates, has already appointed its official representative, LeRoy M. Ennis of Philadelphia. The president and secretary of the Association were authorized by the Board to make these additional appointments.

MEMBERSHIP

A total of 220 dentists in the federal services and two dentists in unorganized territory were approved for active membership by the Board. Affiliate membership in the Association was approved for the following dentists:

Manuel P. Arenas, Philippines
Gerardo N. Aste, Peru
George Boyko, Germany
Isabel Canosa, Cuba
Germanico A. Carreon, Philippines
Harish Chandra, India
H. Sanchez De Cima, Mexico
C. M. E. Eugster, Switzerland
Gerald J. Gabriel, Canada
Atilio D. Lazarus Giron, Honduras
A. C. Henriques, India
Ricardo Y. Ladrido, Philippines
T. Luis Miranda, Chile
Gaudencio R. Ocampo, Philippines
Eliese R. S. Ramos, Brazil
Francisco Reig, Uruguay
Roberto Reig, Uruguay
Ralph Schimensky, Dominican Republic
Heloisa Fonseca Soares, Brazil
S. L. Thapar, India
Armando Toriello, Guatemala
Jose E. Vergel de Dios, Philippines
Alfredo Tobon White, Colombia

1953 ANNUAL SESSION

Membership of the Committee on Local Arrangements for the 1953 annual session, to be held September 28-October 1 in Cleveland, was approved by the Board as follows:

Honorary Chairmen • Frank M. Casto of LaJolla, Calif.; Homer C. Brown of Columbus, Ohio; William L. Wylie of Cleveland; Edward C. Mills of Columbus, and Edward L. Pettibone of Cleveland

Officers • Chairman, Walter J. Pryor of Cleveland; vice-chairmen, Ralph E. Creig and James V. Gentilly; secretary, Stanley R. Suit, and treasurer, Thomas J. McDermott

Subcommittee on Clinics and Motion Pictures • Louis C. Meier, chairman; Edward C. Knoll, vice-chairman; Lyndon E. Cooke, William H. Derrer, Walter O. Donner, Dwight R. Kinsley, Frank J. Lloyd, Leon E. Newman, Russell E. Ricksecker and Earl F. Shankland

Subcommittee on Entertainment and Social Events • Samuel S. Cohen, chairman; Milton Rabine, vice-chairman; Maurice A. Burnely, Cyril J. Caldwell, Jones E. Kurlander, Leopold F. Mesin, Samuel R. Michael, Harold C. Miller, Roger W. Pryor and Leonard H. Samartini

Subcommittee on Information Services • Harry J. Geurink, chairman; William J. Benson, vice chairman; Charles Angelotta, Norman C. Colebrook, Walter G. Deuring, Harvey C. Janke, John C. Jaynes, Harold G. Sheakley, Ronald M. Strachan and John W. Warnock

Subcommittee on Publicity • John T. Reifke, chairman; Walter H. Maurer, vice-chairman; Michael R. Borch, Edward J. Green, Henry E. Kelly, Thomas H. O'Reilly, Richard C. Rice, Stanley J. Ruzicka, Richard C. Spayde and C. Frank Tuma

Subcommittee on Reception • Wiley F. Schultz, chairman; Albiun F. Sadd, vice-

chairman; Everett E. Alexander, B. Holly Broadbent, Bruce A. Curran, James M. Gentilly, Homer D. Grubb, Oscar R. Rosen, Carl J. Stark and Harold C. Van Natta

Subcommittee on Women's Entertainment • Mrs. Herbert J. Hoppe, chairman; Mrs. John T. Reifke, vice-chairman; Mrs. Samuel S. Cohen, Mrs. Ralph E. Creig, Mrs. James M. Gentilly, Mrs. Louis C. Meier, Mrs. Walter J. Pryor, Mrs. Albiun J. Sadd, Mrs. C. Frank Tuma and Mrs. Peter J. Warren

JOURNAL OF ORAL SURGERY

As the terms of three members of the editorial board of JOURNAL OF ORAL SURGERY had expired, the Board of Trustees appointed LeRoy Peterson of St. Louis and Sanford M. Moose of San Francisco and reappointed Don H. Bellinger of Saginaw, Mich. Dr. Peterson and Dr. Moose have served as associate editors of the publication.

The terms of all three appointees will expire at the end of 1955.

SECTION OFFICERS FOR 1954

The following section officers for the 1954 annual session were approved by the Board after receipt of their nomination from the Council on Scientific Session:

Operative Dentistry: Henry M. Tanner of Los Angeles, chairman; Walter Buchman of Chicago, vice-chairman

Oral Surgery and Anesthesia: Thomas J. Cook of Miami, Fla., chairman; Samuel A. Brandon of Portland, Ore., vice-chairman

Orthodontics and Oral Development: Harold K. Terry of Miami, chairman; William S. Brandhorst of St. Louis, vice-chairman

Pedodontics: Willard T. Hunnicutt of Atlanta, Ga., chairman; Maury Massler of Chicago, vice-chairman

Periodontics: F. J. Fabrizio of Washington, D. C., chairman; James P. Hollers of San Antonio, vice-chairman

Practice Management: Loren T. Hunt of Lincoln, Neb., chairman; Hollis A. Askey of Lincoln, Neb., vice-chairman

Complete Prosthodontics: Daniel H. Gehl of Milwaukee, chairman; Hugh McKinnon of Troy, Ala., vice-chairman

Partial Prosthodontics: Everett C. Brooks of St. Louis, chairman; Otto W. Silberhorn of Chicago, vice-chairman

Public Health Dentistry: Roy D. Smiley of Indianapolis, chairman; Irving W. Eichenbaum of New Britain, Conn., vice-chairman

Research: Robert M. Stephan of Bethesda, Md.; chairman; David F. Mitchell of Minneapolis, vice-chairman

Roentgenology: Duane W. Lovett of Iowa City, Iowa, chairman; William E. Koch of St. Louis, vice-chairman

OTHER BOARD ACTIONS

Special Committee on Problems in the Field of Oral Surgery • Definitions of the specialty of oral surgery and of the scope of oral surgery, submitted to the Board of Trustees by the Special Committee on Problems in the Field of Oral Surgery, were approved as a basis for discussion of inter-professional relations at the March 21 meeting of Association representatives and representatives of the American Medical Association.

Leslie M. FitzGerald, James R. Cameron, Philip M. Northrop and Harold Hillenbrand represented the Association at this meeting.

Armed Forces in Dental Education • The Board supported the stand of the Council on Dental Education that "the granting of academic degrees at the graduate level of master of science and doctor of science should continue to be limited to recognized universities or other academic institutions." Legislation recently introduced would authorize the Armed Medical Service Graduate School to grant these graduate degrees.

A provisional approval of the Armed Forces' scholarship plan for procurement of regular dental corps officers was granted by the Board "for this interim period of emergency." The Board approved the general proposal for a scholarship plan while withholding approval of any specific plan.

Red Cross First Aid Training for Dentists • A resolution urging all members of the Association to participate in the new Red Cross First Aid training program for

dentists was passed by the Board. Agencies of the Association and of constituent societies were asked to publicize this activity to members.

The Council on Federal Dental Service, through its subcommittee on civil defense, had reported to the Board that the Red Cross is willing to conduct first aid classes which would be limited to dentists and which would be taught on a professional level.

A statement by R. W. Bunting, dental consultant to the Federal Civil Defense Administration, advised that the Civil Defense committee of each dental society may apply to the local Red Cross headquarters for such classes.

Certificates of Recognition • In compliance with the directive of the 1952 House of Delegates, recognition certificates will be prepared for retiring and past members of the Board of Trustees and elected officers.

Rejection of Publication Offer • The Association was offered the opportunity to purchase the magazine *D.D.S., A Digest of Dental Science*. The Board declined the offer with thanks.

Increased Price for Student Journals • In order to qualify student copies of THE JOURNAL for second class mail, the Board has asked that the student subscription price be raised to one half of the advertised price. This would be a 50 cent annual increase, from $3.00 to $3.50.

In presenting this proposal, the business manager of the Association stated that the present method of shipping THE JOURNAL to students, in mass packages by express, is unsatisfactory to students, schools and the Association. If student copies were raised to "one half of the advertised price," they would qualify for second-class mailing and could be mailed directly to the student at his residence.

If the Board's proposal is adopted by the House of Delegates, the change of rates will take effect January 1, 1954.

BOARD MEMBERS PRESENT

The following officers participated in the meeting: Otto W. Brandhorst of St. Louis, president; Leslie M. FitzGerald of Dubuque, Iowa, president-elect; Henry F. Westhoff of St. Louis, first vice-president; F. A. Pierson of Lincoln, Neb., second vice-president; John A. O'Keefe of Washington, D. C., third vice-president; Harry Lyons of Richmond, Va., speaker of the House of Delegates; Harold Hillenbrand of Chicago, secretary; H. B. Washburn of St. Paul, Minn., treasurer, and Lon W. Morrey of Chicago, editor.

Trustees present at the meeting included: W. R. Alstadt of Little Rock, Ark., twelfth district; W. Earle Craig of Pittsburgh, third district; L. H. Jacob of Peoria, Ill., eighth district; James E. John of Roanoke, Va., fifth district; Earl G. Jones of Columbus, Ohio, seventh district; Bernerd C. Kingsbury of San Francisco, thirteenth district; Daniel F. Lynch of Washington, D. C., fourth district; Obed H. Moen of Watertown, Wis., ninth district; Percy T. Phillips of New York, second district; C. S. Renouard of Butte, Mont., eleventh district; Arthur F. Schopper of Kansas City, Mo., sixth district; Charles I. Taggart of Burlington, Vt., first district, and Lewis W. Thom of Minneapolis, tenth district.

HOUSING BUREAU OPENS. RESERVATIONS NOW ACCEPTED

Hotel accommodations for the Association's 94th annual session must be reserved through the housing bureau in Cleveland, on the standard form to be found on page A-63 of this issue of THE JOURNAL, it has been announced by the Committee on Local Arrangements.

The housing bureau, which opens April 1 at 511 Terminal Tower, Cleveland, will handle all hotel reservations for the 94th annual session, to be held September 28-October 1. Requests submitted to any

other agency will not be filled, it has been stated.

Dentists who plan to attend the meeting have been advised to apply for housing promptly by filling out the coupon on page A-63. Those who make their reservations early will be able to obtain the type of accommodations they wish; the housing bureau may not be able to fill late requests, the Committee reported.

OUTPATIENT DENTAL PROGRAM OF VA TERMED TOO EXTENSIVE

Both the Veterans Administration and Congress have failed to recognize that the ambitious VA program of outpatient dental care could result in life-long federally subsidized dental care for the majority of the ever increasing veteran population.

This was the thesis of the statement presented to the American Legion's conference on VA health services, which convened March 1 in Washington, by R. H. Friedrich of Plainfield, N. J., chairman of the Council on Federal Dental Services.

Dr. Friedrich stressed that the Association does not oppose the provision of dental care for service-connected dental conditions and defects. He stated, however, that the present VA determination of what constitutes a service-connected dental condition is "completely unreasonable" and if retained "will require the continued expenditure of hundreds of millions of dollars of federal funds."

In addition to Dr. Friedrich, the Association was represented by Bernard J. Conway, secretary of the Council on Federal Dental Services.

ASSOCIATION MEMBERSHIP REACHES 52,700 BY MARCH 1

At the end of February 52,710 members had paid their 1953 dues to the American Dental Association. This total kept pace with the record-breaking membership totals of 1952.

Dentists whose membership dues were not received by April 1 have been cancelled from the subscription list of THE JOURNAL; they will be reinstated when their memberships have been renewed.

UNIONS, COUNCIL TO CONFER ON DENTAL HEALTH PROGRAMS

Health officers of five national labor unions will confer April 13 in Chicago with the Council on Dental Health regarding dental health programs. Unions which are expected to send representatives are the American Federation of Labor, Congress of Industrial Organizations, International Association of Machinists, Railway Labor Executives and United Mine Workers.

The purpose of the conference will be to exchange information on the aims of labor organizations and the Association in any union-sponsored program to provide dental service.

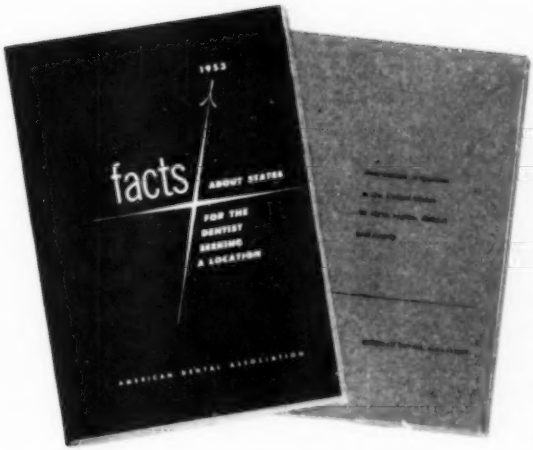
DEADLINE FOR PARTICIPANTS IN SCIENTIFIC SESSION SET

Association members who wish to present films, exhibits or table clinics at the 94th annual session September 28-October 1 in Cleveland must submit their application forms by June 1, the Council on Scientific Session has announced.

The applications may be obtained by writing to the Council at 222 East Superior Street, Chicago.

FILM INQUIRIES TO BE SENT ONLY TO FILM LIBRARY

All requests for film information or film, slide and filmstrip bookings should be directed to the Association Film Library, 222 East Superior Street, Chicago 11. The Library will continue to handle the distribution of films; however, the new return address for motion pictures, slides and filmstrips is United World Films,



Dental veterans who are seeking a location for establishing their dental practice will find these two new publications of the Association's Bureau of Economic Research and Statistics extremely helpful.

"Distribution of Dentists in the United States by State, Region, District and County" contains statistics on the number of dentists and the general population of each area, its population growth, per capita buying income and per capita retail sales.

"Facts about States for the Dentist Seeking a Location" contains information on the ratio of dentists to population, economic conditions in dentistry and in general within the states, dental licensure requirements and lists of officials in the several states from whom additional information is obtainable.

Both booklets may be obtained free of charge by writing to the Order Department of the American Dental Association, 222 East Superior Street, Chicago 11.

Inc., 605 West Washington Boulevard, Chicago. This agency houses and ships the films, but does not handle correspondence regarding them and does not book them.

RESEARCH FILM AVAILABLE ON MIXING SILICATE CEMENT

A Method of Mixing Silicate Cement, a new film produced by the National Bureau of Standards and the Association's Council on Dental Research, may now be obtained on loan from the Film Library of the Association.

The film is a 16 mm., color and sound film, eight minutes in length. It demonstrates a new method of mixing silicate cements in a closed container whereby the maximum amount of powder is incorporated into a given quantity of liquid independent of atmospheric conditions.

The film also is offered for loan or purchase by the Office of Scientific Publications of the National Bureau of Standards, Washington 25, D.C. Purchase price is $40.31.

CONFERENCE ON JOURNALISM TO BE HELD JUNE 5-6

A prospectus for a National Dental Advertising Bureau will be presented at the Council on Journalism's second annual Dental Journalism Conference, to be held June 5-6 in the Central Office of the Association.

The advertising bureau, which was suggested and considered at the 1952 conference, would act as the agent for constituent and component society publications in acquiring national accounts.

Problems encountered in editing, producing and financing a dental publication will also be studied by the Conference, it has been announced by William L. Barnum of Portland, Ore., chairman of the Council on Journalism. The program will be presented by specialists in layout designing, editing and printing, as well as advertising.

Constituent dental society officers have been asked to cooperate in sending their dental editors to the Conference.

INDEX TO DENTAL LITERATURE FOR 1952 PUBLISHED

A total of 158 dental journals and serials were indexed during the past year for inclusion in the newly-published 1952 volume of *Index to Dental Literature* in the English language, it has been announced by the Bureau of Library and Indexing Service.

The *Index* may be purchased at $10 a copy from the Order Department of the Association, 222 East Superior Street, Chicago 11.

DENTAL LIBRARIANS TO MEET JUNE 12-13

A meeting for dental librarians, the third in a series sponsored by the Bureau of Library and Indexing Service, will be held June 12-13 in the Central Office.

Main topics to be considered at the conference will include: a dental subject heading list, a union list of foreign language dental journals, the completed revision of the Black classification and the criteria for the librarian's self-appraisal of the library program.

Legislation

COUNCIL ON LEGISLATION REVIEWS BILLS IN CONGRESS

For the information of readers of THE JOURNAL, the secretary of the Council on Legislation has issued the following information on health legislation recently introduced in both houses of Congress.

Although the Council on Legislation has already noted more than 100 bills of interest to the Association which have been introduced in the 83rd Congress, to date there has been no Congressional committee activity in the field of health legislation.

New Cabinet Department • On March 12 President Eisenhower sent Reorganization Plan No. 1 of 1953 to Congress. Similar in purpose to defeated Reorganization Plans No. 1 of 1949 and No. 27 of 1950 it will, if approved, elevate the existing Federal Security Agency to cabinet status as the Department of Health, Education and Welfare.

The Association, which vigorously opposed the earlier plans, will not fight this one. The new plan has one significant difference from the previous ones in that it will provide for an Assistant Secretary for Health and Medical Affairs to advise the Secretary with respect to the health and medical programs of the Department and legislation in this field. The Assistant Secretary must be a recognized leader in the medical field with "wide nongovernmental experience."

Military • In the field of military affairs, H.R. 175, by Rep. L. M. Rivers (D., S.C.) again seeks enactment of the Army Dental bill. No companion bill has been introduced in the Senate.

Other military bills relate to Public Law 779. For purposes of Priority determination, H.R. 97 and S. 70 would give the same credit to dentists who served with allied countries in World War II as is given to dentists who served with U. S. forces.

H.R. 428, 1721 and 1822 would decrease required Korean service by the length of World War II service, while H.R. 3706 would provide for a graduated period of Korean service contingent upon length of World War II service, with a minimum of nine months. According to J. Claude Earnest, a member of the Council on Legislation, action on these

bills will probably be delayed until the introduction of the administration proposal for extension and revision of Public Law 779.

Dental Education • Four bills would have application to the field of dental education.

H.R. 2329, an administration measure, would authorize the Army Medical Service Graduate School to award master and doctor of science degrees in dentistry;

H.R. 2718 would establish a United States Medical and Dental Academy with a student body of not to exceed 2,264 appointed in the same manner as West Point cadets;

S. 157 would provide federal loans to college students;

S. 461 would establish a five-year program of scholarships for postgraduate education in public health.

Probably only H.R. 2329 will receive attention at this session, according to Thomas J. McDermott, vice-chairman of the Council on Legislation.

General Health • In the area of general health bills H.R. 1817, the old Wagner-Murray-Dingell bill has again been introduced by Rep. J. D. Dingell (D., Mich.). However, E. Harold Gale, chairman of the Council on Legislation, expects no committee action on this proposal now.

A bill which may receive some attention is the National Health Act of 1953, introduced in the Senate as S. 1153 by Sen. I. M. Ives (R., N.Y.) and Sen. R. E. Flanders (R., Vt.) and in the House by Rep. Robert Hale (R., Me.) and Rep. J. K. Javits (R., N.Y.) as H.R. 3582 and H.R. 3586.

These bills, originally introduced in the 82nd Congress, propose (1) a detailed study of the health needs of the nation; (2) the creation of an 11-member Federal Health Council; (3) the use of federal funds on a grant-in-aid basis for state health plans which make available personal health care, hospital and related services through cooperating prepayment health service plans; (4) loans to prepayment health service plans for establishing and equipping health centers; (5) federal aid to medical and nursing schools and (6) the creation of a Federal Health Study and Planning Commission to formulate a 20-year national health plan.

Other proposals on the docket include a group of bills proposing an increase in the amount which may be deducted from income on account of sums spent on medical and dental care, the Child Research Act and the Local Public Health Units Act. Still other bills would provide limited hospital and medical care for OASI beneficiaries.

Reed-Keogh • The Reed-Keogh bill which would permit self-employed persons to avoid the payment of taxes upon 10 per cent of their net incomes up to $7,500 annually has again been introduced. Paul E. Jones, a member of the Council, reports that it is hoped that hearings will be held on this measure some time this spring.

OASI for Dentists • One bill has been introduced which would include dentists under Old Age and Survivor's Insurance, but Edward R. White, a Council member, anticipates no action on it until a special committee under Rep. Carl Curtis (R., Neb.) has filed its report on an investigation of the Social Security program.

Equalization Pay • The Council on Legislation expects that the administration will shortly recommend the extension of the $100 equalization pay for dentists and physicians. This was the subject of a bitter debate in the Senate last year as a result of which a special task force was appointed in the Department of Defense to study the entire subject of special pay. The Commission has prepared its report and will file it shortly, after which the matter will be submitted to Congress.

CABINET STATUS FOR FSA ASKED BY EISENHOWER

The elevation of the Federal Security Agency to Cabinet status as the Department of Health, Education and Welfare is proposed in Reorganization Plan No. 1, which was submitted to Congress March 12 by President Eisenhower.

Under the Plan's proposals the Federal Security Administrator, Mrs. Oveta Culp Hobby, would become Secretary of the Department. A special assistant on health and medical affairs would be appointed from the medical profession to review the health and medical programs of the U. S. Public Health Service and other FSA agencies. He would advise the Secretary "with respect to the improvement of such programs and with respect to necessary legislation in the health and medical fields."

The special assistant to the secretary would have responsibility, also, "for liaison on behalf of the Secretary with important nongovernmental groups, such as the American Medical Association, American Dental Association, the American Hospital Association, American Public Health Association and Association of State and Territorial Health Officers. Such liaison will not, of course, supplant liaison by the constituents of the Department but would be broadly representative of the total interests of the Department in the health field."

The job description of the special assistant's function concludes that he will be "the top staff policy advisor to the Secretary on health and medical matters, will represent the Secretary in important external relationships of the Department with national and international bodies concerned with health and medical matters, and will, as needed, coordinate related health and medical programs within the Department."

A.M.A. Approval of Plan • A special meeting of the American Medical Association's House of Delegates which assembled in Washington, D. C., March 14 endorsed President Eisenhower's proposal to establish a Department of Health, Education and Welfare, after listening to the Chief Executive assure them that he would oppose socialized medicine.

The House endorsement termed the reorganization plan "a step in the right direction," but reaffirmed the A.M.A.'s desire for an independent Department of Health.

The House emphasized also that the endorsement did not prejudice the organization's right to review the workings of the new department after it has been in operation for a period of time. In the past the medical organization has opposed the elevation of the Federal Security Agency to departmental status.

Dental Societies

ST. LOUIS SOCIETY SUPPORTS CRUSADE FOR FREEDOM

The St. Louis Dental Society promoted the Crusade for Freedom, which was endorsed by the Association's House of Delegates, with an exhibit and appeal for funds at its February meeting. Designed by Francis X. Thornton, the exhibit included balloons with messages of freedom inside similar to those that are floated behind the Iron Curtain. Contributions to the Crusade by St. Louis dentists exceeded expectations, reports Theo A. Behrens, president of the Society.

FIVE DISTRICTS IN ARKANSAS, LOUISIANA, TEXAS TO MEET

A new regional organization, the Ark-La-Tex Dental Congress, has been formed by the Southwestern District of Arkansas, the First and Third Districts in East Texas and the Fourth and Eighth Districts of Louisiana, to "create a closer

fellowship between the dentists of these sections and to promote and develop the science of dentistry."

The executive council of the Congress met February 28 and elected the following officers: Dudley R. Isom of Shreveport, La., president; M. F. Jarrell of Alexandria, La., president-elect; W. L. Kelly of Paris, Texas, vice-president and Thomas W. Pope, Jr., of Shreveport, secretary-treasurer.

The first meeting of the Congress will be an all-day meeting April 20 in Shreveport, with Sterling V. Mead of Washington, D. C., as featured clinician and lecturer.

Further information on the organization and the meeting may be obtained from Dr. Isom at 720 Medical Arts Building, Shreveport, La.

MARYLAND DENTAL ASSOCIATION ANNOUNCES CLINICIANS

The Maryland State Dental Association's 70th annual convention will be held May 4-6 at the Lord Baltimore Hotel in Baltimore.

Morning sessions will feature papers by O. B. Commer on restorative dentistry; Ruth Martin on children's dentistry; Helmut Zander on the physiology of the dental pulp, and John C. Krantz on newer developmens in local anesthetics.

Afternoon sessions will be devoted to panel discussions on these same subjects and will feature other eminent dentists.

Information and reservations may be obtained by writing to Eugene Pessagno, Medical Arts Building, Baltimore.

ARIZONA DENTAL ASSOCIATION TO MEET APRIL 22-24

The annual scientific sessions of the Arizona State Dental Association will be held April 22-24 at Tucson. Featured clinicians will include Victor H. Sears of Salt Lake City; Alfred L. Lopez of Albuquerque, N. Mex.; Edward C. Thompson of Urbana, Ill.; Nathan Friedman of Beverly Hills, Calif., and Joe G. Sweet, II, of San Francisco.

Information on the event may be obtained from E. M. Scott, secretary, 17 East Weldon, Phoenix, Ariz.

Public Health

NEWSPAPER, BUREAU PROTEST ANTI-FLUORIDATION ARTICLE

The *St. Louis Post-Dispatch* has joined the Association's Bureau of Public Information in protesting the article "Go Slow on Fluoridation" by James Rorty, which appeared in the February issue of *Harper's Magazine*.

The Bureau's protest, presented in a letter to the publication's editor, terms the article "an amazing example of irresponsible journalism," and expresses the hope "that *Harper's Magazine* will not continue to oppose the benefits of fluoridation for all our children without at least reporting the findings of the great body of men of science who have conducted the actual research on fluoridation."

The protest of the *Post-Dispatch*, contained in an editorial of February 13, objects that the article is based on the Delaney report "with its vaguely negative conclusions." The article "is shot through with phraseology designed to scare the reader right out of his shoes," asserts the editorial. The *Post-Dispatch* restates its support of fluoridation for St. Louis with these words:

> Fluoridation has one effect, and even the Delaney committee agreed on that: it will reduce the number of cavities in children.

Even Mr. Rorty admits that tooth decay is probably the most prevalent chronic disease of modern man. Since fluoridation is the only cheap, safe and practical method of dealing with the disease, why should we delay in taking advantage of the procedure?

H. TRENDLEY DEAN RETIRES: FRANCIS A. ARNOLD APPOINTED

The retirement of H. Trendley Dean as director of the National Institute of Dental Research and the appointment of Francis A. Arnold, Jr., to the post took place March 10, it has been announced by Leonard A. Scheele, Surgeon General of the USPHS.

H. T. Dean

Dr. Dean is eminent as a pioneer in research leading to the use of fluoridated water to reduce the incidence of dental decay in children. When Dr. Dean was assigned in 1931 to study dental fluorosis, Frederick S. McKay of Colorado Springs had already determined that fluorides in public and private water supplies were the cause of mottled enamel. It was Dr. Dean who discovered that persons with mild cases of fluorosis had teeth which resisted dental decay.

Born in East St. Louis, Ill., in 1893, Dr. Dean was graduated from the St. Louis University dental school in 1916. He joined the U. S. Public Health Service in 1921. During World War I he served as a Captain in the Army Dental Corps, and during World War II he was a Colonel.

F. A. Arnold, Jr.

The new director, Dr. Arnold, has been associate director of the National Institute of Dental Research since 1948. A native of Orrville, Ohio, he was graduated from Western Reserve University dental school in 1934, when he joined the Public Health Service.

CARLOS H. SCHOTT HONORED BY CINCINNATI HEALTH GROUP

Carlos H. Schott of Cincinnati, former trustee of the Association and former president of the Cincinnati Dental Society and the Ohio State Dental Association, has been awarded the annual citation of the Cincinnati Public Health Federation "for distinguished service in the cause of public health."

The scroll which accompanied the engraved gold key, symbol of the award, cites Dr. Schott's 44 year record as an active member of the Public Dental Service Society, which he helped to found. He also founded the first free dental clinic for school children in Cincinnati.

C. H. Schott

International

LIST OF FOREIGN MEETINGS ISSUED BY F.D.I.

In the interests of American dentists who may wish to attend the international dental meetings to be held in other countries during the coming months, the secretary of the Fédération Dentaire Internationale, Gerald H. Leatherman of London, has prepared the following list, which contains not only the date and site of each meeting, but also the name and address of the chairman or secretary of each.

The meeting of the Fédération itself will be held July 26-August 1 in Oslo, Norway. Further information may be obtained by writing to Dr. Leatherman at 35 Devonshire Place, London, W. 1.

Semaine Odontologique, 61e Congrés Cirurgiens Dentistes Independants	April 9-15	Paris	Inquiries to Dr. Dupont	29 Boulevard Malesherbes, Paris
Spanish American Congress of Odontology	May 1-7	Seville		Calla Villanueva, 5 Madrid, Spain
Societe Suisse Odontologie	May 15-17	Burgenstock	Le Secretaire S. S. O.	37 Spitalgasse, Berne
Danish Dental Association	May 16-17	Odense	Dr. F. Orth	87 Vester Voldgade, Copenhagen
Ontario Dental Association	May 18-20	Toronto	Dr. D. W. Gullett	234 St. George St., Toronto
British Dental Association	July 6-10	Buxton Derbys.	H. Parker Buchanan, Esq.	13 Hill Street, London, W. 1
Geneva Congress on Periodontics	July 13-19	Geneva	Dr. J. N. Nally	8 rue de Saussure, Geneva
American Dental Society of Europe	August 4-7	Bergen, Norway	F. D. Derrick	140 Park Lane, London, W. 1
Scandinavian Dental Society	August 12	"Cruise"	Dr. K. Gard	17 Incognitogatan, Oslo, Norway
XIIth German Dental Congress	September 16-20	Dusseldorf, Germany	Dr. E. Muller	bei der Johanniskirche, 20 Hamburg, Altona 24 a
XXVIIIth Congress of Stomatology	October	Bari, Italy	Prof. A. Benagiano	44 Via Salaria, Roma, Italy
XIIIeme Congrés Français de Stomatologie	October 5-11	Paris	Dr. J. Duclos	9 rue Hotel de Ville, Lyon
Canadian Dental Association	October 18-21	Montreal	Dr. D. W. Gullett	234 St. George St., Toronto

PHILIPPINES TO OBSERVE ANNIVERSARY OF DENTISTRY

A meeting to mark the silver jubilee of the Philippine Dental Association and the golden jubilee of recorded dentistry in the Philippines will be held in Manila during the week after Easter, it has been announced by B. B. Erana, president of the Philippine Dental Association.

DENTAL CONGRESS TO MARK 50TH YEAR OF *BELGIAN REVUE*

An international dental congress in observance of the fiftieth anniversary of the *Revue Belge de Stomatologie* will be held April 30 to May 4 at Knocke-sur-Mer, Belgium, under the direction of H. Priem, president.

Further information on the scientific

and social events of the congress and a list of cooperating hotels and transportation companies may be obtained by writing to C. Gijsel, secretary, 5, Marché, Eeklo, Belgium.

FRENCH DENTAL CONGRESS SCHEDULED FOR APRIL 9-15

The 61st Dental Congress and Odontological Week of the French National Confederation of Dental Societies will be held April 9-15 at Exhibition Park, Porte de Versaille, Paris.

In addition to scientific sessions and the meetings of all French dental societies, there will be an exhibition of equipment, products and dental supplies which will fill the exhibition hall. For the first time in France, a continuous program of dental films will be shown throughout the week, it has been announced by Maurice Vincent of Paris, secretary general of the National Confederation.

CANADIAN REPORT ON N.H.S. GIVES BRITISH DENTISTS' VIEW

British Dentistry in 1952, a report by Don W. Gullett, secretary of the Canadian Dental Association, was issued March 2 by the C.D.A.

Based on interviews with British dental practitioners during the summer of 1952, the report lists seven main difficulties of practicing dentistry under the National Health Insurance Act.

The difficulties, as itemized by dentists, are: loss of incentive, interference with clinical freedom, discipline in the hands of N.H.S. administrators, bad public relations, apathy in the profession, changes in regulations and the inability of dentists to "stay out" of the scheme and retain public acceptance.

The new report is a follow-up of a 1948 report by Dr. Gullett, in which the viewpoint of dentists on the National Health Service was first sought.

SPANISH-AMERICAN CONGRESS TO BE HELD IN SPAIN MAY 1-7

The first Hispano-American Congress of Odontology will be held May 1-7 in Seville, Spain, under the aegis of the Spanish Colleges of Odontology. North American and South American dentists have been invited to attend.

Dental caries, periodontics, complete prosthesis and public health dentistry will be the four main subjects of the Congress. Information may be obtained by writing to I Hispano-American Congress of Odontology, Calla Villanueva, 5, Madrid, Spain.

Veterans Administration

JOHN FAUBER TELLS CONGRESS COSTS OF VA DENTAL PROGRAM

Congress must either appropriate a continually increasing amount of funds for the outpatient dental care program of the Veterans Administration or must reduce the program's scope, declared John E. Fauber, assistant chief medical director for dental services of the VA, in testimony before the House Veterans Affairs Committee on February 25.

During the last six and one half years, Dr. Fauber stated, more than five million applications for outpatient dental treatment were received; one half of these cases were treated at a cost of 260 million dollars.

The number of applications and the cost of the treatment will increase, as 11 million to 16 million veterans are eligible to receive VA care, and that number currently is being increased by about one million veterans each year, Dr. Fauber said.

However, Congress has failed to appropriate sufficient funds to care for the pending cases, Dr. Fauber asserted, and funds provided for fiscal 1953 will fall 24 million dollars short of requirements.

"It is only fair to the veteran that Congress either take these benefits seriously enough to appropriate sufficient funds or reduce the benefits in accordance with what Congress is willing to appropriate," Dr. Fauber said. (See Washington News Letter)

Dental Education

EMORY DENTAL SCHOOL GIVEN FUNDS TO TEACH MANAGEMENT

A grant of $3,000 has been received by Emory University School of Dentistry, together with the assurance of continuing grants during the next five years totaling a minimum of $15,000, for the purpose of supporting undergraduate and postgraduate programs in practice management.

Anonymous donors have directed that the funds be used to improve opportunities for instruction in dental practice management which will result in improving the level of dental service to the public. William A. Garrett, professor of dentistry, will be in charge of the programs.

ORGANIZATION OF PRACTICE TO BE TOPIC OF WORKSHOP

Practice administration will be the subject of the week-long workshop to be presented by the W. K. Kellogg Foundation Institute of the University of Michigan, September 6-12 at Ann Arbor, Mich.

The workshop will attempt "a critical appraisal of the best patterns for the dentist to adopt in organizing and administering his practice and fulfilling his niche of professional responsibility in his community."

Morning sessions will feature critical lectures by specialists in the field of practice administration. Workshop sessions in the afternoon will be conducted by eight committees which will study different aspects of the subject.

Chairmen of the eight committees will be: Maynard K. Hine, Thomas L. Hagan, Harry M. Klenda, Ralph H. Campbell, Cecil H. Bliss, Wallace N. Kirby, Harold J. Noyes and A. V. Purinton.

Directors of the workshop are Kenneth A. Easlick and W. R. Mann, co-chairmen, and P. H. Jeserich, dean of the University of Michigan School of Dentistry. The program and application form may be obtained from Dr. Mann, associate director of the Institute, University of Michigan, Ann Arbor, Mich.

UNIVERSITY OF ROCHESTER CITES INCREASE IN STIPEND

Stipends ranging from $2,400 for single men to $3,600 for men with dependents are offered in connection with the fellowships in basic science and research training at the University of Rochester School of Medicine and Dentistry, Rochester, New York.

A recent increase in the stipend has made the amount listed in the March 1953 issue of THE JOURNAL incorrect.

The fellowships are offered to dental graduates wishing to prepare for teaching or research careers. Appointment is for one or more years; candidates may work for M.S. or Ph.D. degrees.

Application should be made to the department of dentistry and dental research, University of Rochester School of Medicine and Dentistry.

DENTAL SCHOOLS ANNOUNCE POSTGRADUATE COURSES

Temple • Lewis Fox will present a course on the fundamentals of occlusion in relation to the physiology and pathology of periodontal supporting tissues June 8-10 at Temple University School of Dentistry.

Applications may be obtained from the director of postgraduate studies, Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40.

Illinois • A postgraduate course in roentgenology which is designed for the general practitioner will be offered at the University of Illinois College of Dentistry on six consecutive Wednesday evenings starting April 8.

The course is entitled "Roentgenology—undistorted long cone technic" and will feature laboratory instruction and practice. It will be given each Wednesday, 5-7 P.M., by W. W. Wainwright, professor of radiology and head of the department. Enrollment will be limited to 12.

Information and application forms may be obtained from the College at 808 South Wood Street, Chicago.

EMORY DENTAL STUDENTS CONDUCT ANNUAL CLINIC DAY

More than 300 dentists and dental students participated March 2 in the third annual clinic day presented by the student American Dental Association of Emory University School of Dentistry.

The aims of the event, as listed by the sponsoring student group, are "to help students to develop an understanding of the procedure in presenting a dental clinic and to present to the students subjects of interesting and practical nature."

Guests who addressed the students at an evening banquet included Leslie M. FitzGerald, president-elect of the American Dental Association; Irwin T. Hyatt, president of the Georgia Dental Association, and J. G. Stipe, vice-president of the University.

National Defense

ARMY DENTAL SURGEON FOR EUROPEAN COMMAND DIES

Col. Beverley M. Epes, dental surgeon for the United States Army European Command for the past three years, died February 12 in Heidelberg, Germany, at the age of 59.

Colonel Epes had spent 35 years in the Army Dental Corps, including service as chief of oral surgery at Walter Reed Army Hospital, Washington, D. C., and as chief of personnel in the dental division of the Office of the Army Surgeon General.

His foreign assignments included service in Europe during World War I, when he was awarded the Purple Heart; in Panama, and in the Asiatic Pacific Campaign. A native of Virginia, he was graduated from the Atlanta Dental College of Atlanta, Ga., in 1915. In addition to his membership in the American Dental Association, Colonel Epes held membership in Omicron Kappa Upsilon and fellowship in the American College of Dentists.

Col. B. M. Epes

348 DENTISTS TO BE TAPPED FOR APRIL INDUCTION

An April call-up of 348 dentists has been announced by the Department of Defense. Dentists in Priority III up to the age of 41 are now liable for induction, the Selective Service System reports.

NEW APPOINTMENTS ANNOUNCED FOR GENERALS SNYDER, COWAN

The assignment of Brig. Gen. Oscar P. Snyder, DC, director of dental activities at Walter Reed Army Medical Center, to the post of dental director at Brooke Army Medical Center and the appointment of Brig. Gen. Egbert W. Cowan, DC, to replace General Snyder at Walter Reed Army Medical Center were announced by Maj. Gen. Walter D. Love, DC, chief of the Army Dental Corps.

General Snyder will succeed Brig. Gen. Lynn H. Tingay, DC, now retired, and is scheduled to report April 24 at the Center, which is located at Fort Sam Houston, Texas. He ends a five-year tour of duty at Walter Reed Army Medical Center.

General Cowan has been serving since last October 13 as assistant chief of the dental corps in the Office of the Surgeon General of the Army.

General

PENNSYLVANIA DENTAL SCHOOL ANNOUNCES JUBILEE PROGRAM

The June 10-13 celebration in observance of the 75th anniversary of the University of Pennsylvania School of Dentistry will include presentations by six essayists, a visual education and social program.

The essayists to be presented June 11 and 12 will include: Lewis I. Fox on periodontics, George Hollenback on gold inlay, Ernest Nuttall on crown and bridge, Leslie M. FitzGerald on oral surgery, Roy G. Ellis on pedodontics and Clyde Schuyler on complete denture service.

Programs of the four-day event may be obtained by writing to the jubilee committee of the School of Dentistry, University of Pennsylvania, Philadelphia 4.

ALPHA OMEGA FRATERNITY PLANS NATIONAL DIRECTORY

As the Alpha Omega fraternity is planning to issue a new national directory of members, efforts are now being made to trace those members whose addresses are not on file. Alpha Omegans who are not receiving fraternity literature have been requested to write to the national headquarters office at 49 East Nineteenth Street, New York 3.

PLAN HOMECOMING AT CHICAGO COLLEGE OF DENTAL SURGERY

The 70th annual homecoming of the alumni of Chicago College of Dental Surgery, Loyola University, will be held April 15-16. Joseph Porto, president of the alumni organization, has announced

During April millions of people in the United States will see this colorful poster, "Play Safe—See Your Dentist Twice a Year," on the thousands of delivery trucks operated by linen and towel suppliers. The posters are the contribution of the Linen Supply Association of America to the advancement of dental health, as part of the organization's program of promoting worthy public causes.

that a panel on children's dentistry, scientific papers and a motion picture program will be features of the meeting.

Maury Massler, George W. Teuscher and Richard F. Streitz will participate in the panel on children's dentistry, which will stress the soft tissues of the child's mouth. Other essayists include Lt. Col. Garnet P. Francis, Jr.; Walter A. Buchmann, M. Jules King and Emil D. W. Hauser, M. D.

PACIFIC COAST SOCIETY OF PROSTHODONTISTS TO MEET

The Pacific Coast Society of Prosthodontists will honor Milus M. House of Whittier, Calif., at a testimonial dinner April 18 during the organization's annual meeting at the Miramar Hotel, Santa Monica, Calif. Dr. House, who will celebrate his fiftieth year of practice, will be cited for "his unselfish and outstanding contributions to dentistry."

The annual meeting of the Pacific Coast Society will take place April 17-19. Further information on the meeting and the testimonial dinner may be obtained by writing to A. W. Spaulding, secretary-treasurer, 4350 Eleventh Avenue, Los Angeles 8.

CHARLES M. WALDO, EDUCATOR, DENTAL INVESTIGATOR, DIES

Charles M. Waldo, associate professor of orthodontics at the Harvard School of Dental Medicine, died January 29 at the age of 46. Dr. Waldo, who had earned his A.B., D.D.S. and M.S. degrees from the University of Michigan, was noted for his research on the role of hormones and other factors in the growth and development of face and jaw bones.

He taught at the University of Michigan and conducted research at the Child Research Council, Denver, before joining the Harvard faculty in 1941.

ENDODONTISTS ASSOCIATION ANNOUNCES OFFICERS FOR 1953

The American Association of Endodontists installed L. A. Lucas of Oklahoma City, Okla., as president for 1953 at the organization's annual meeting February 7-8 in Chicago.

Other officers for the coming year include: N. Weir Burkman of Birmingham, Mich., president-elect; Harry Healy of Indianapolis, vice-president; Vincent B. Milas of Chicago, secretary; Thomas C. Starshak of Chicago, treasurer, and Victor H. Dietz of St. Louis, editor.

Also . . . The Office of Price Stabilization announced the decontrol of dental laboratories February 18. . . . The sixth State Secretaries' Management Conference will meet November 16-18 in the Central Office. Reports of the fifth Conference were issued in March. . . . Col. Herman J. Lambert, Third Army Dental Surgeon, retired March 1 after 37 years of military service, which included overseas service in both World Wars. . . . The first *Bulletin of the History of Dentistry*, to be issued monthly to members of the American Academy of the History of Dentistry, appeared in March. Edited by George B. Denton of Chicago, it contains news of interest to dental historians and a bibliography of new books on the history of dentistry. . . . The Missouri and the Kansas State Dental Assistants Association will hold a joint certification examination for dental assistants May 10 in Kansas City, Mo. Information may be obtained from Miss Eunice Snyder, 1005 First National Bank Building, Wichita, Kans. . . . The American Association of Dental Examiners will meet September 25-26 in Cleveland, Ohio. Information on the program may be obtained from C. A. Bumstead, secretary, 924 Stuart Building, Lincoln, Neb.

Book Reviews

USEFUL DRUGS

By the Council on Pharmacy and Chemistry, American Medical Association. Fifteenth edition. 273 pages. Index. Price $2.50. Philadelphia, J. B. Lippincott Co., 1952.

The index to *Useful Drugs* lists nearly 750 separate and distinct preparations, old and new, consisting mostly of simple drugs. Many of the older drugs which are no longer described in *New and Nonofficial Remedies* are included. A few mixtures are described, but the many nonessential modifications which constitute the majority of pharmaceutical products on the market today are absent.

Usefulness is the primary criterion for listing in this book. Properties, actions and uses and dosage are covered. The selection of drugs is sound, and the information concerning them is reliable, as might be anticipated.

Generic names for drugs are used exclusively, thus making it difficult in some instances to recognize some of those which are most commonly referred to by proprietary names. Latin synonyms for the names of official drugs are given. Structural formulas are not listed.

Information useful in writing prescriptions is included. There is a therapeutic index. The page size is relatively small, and since the book is not very thick, it can be carried easily in a large coat pocket.

Useful Drugs is thus a convenient source of dependable information. Its size and scope should make it especially attractive to interns and physicians. It will be a legitimate addition to any dental or pharmaceutical library.

Donald A. Wallace

ACCEPTED DENTAL REMEDIES

18th edition. 208 pages. Index. Price $1.50. Chicago, American Dental Association, 1953.

The yearly revision and constant expansion of this book is a reflection of the rapid growth of developments in the field of dental therapeutics. The book is an invaluable guide to the practitioner both in the selection of drug preparations whose safety and usefulness have been established and as a source of up-to-date information on many topics related to the treatment of oral disease.

The standards for evaluation of products by the Council on Dental Therapeutics are outlined in the introductory section, and a short chapter demonstrates the simplicity and desirability of writing prescriptions for the patient. There are chapters on anesthetics, antibiotics, disinfection of instruments, analgesics and sedatives, mechanical aids, nutritional factors, useful formulas, and miscellaneous items employed in office practice. Each chapter begins with brief discussion of fundamental pharmacologic and therapeutic considerations which will be found highly informative and reliable. Chemical formulas are shown for most of the compounds.

Many new products are included in the present revision and a number of recent references have been added to the excellent bibliographies that follow each chapter. Where obsolete preparations or technics have been omitted, a brief explanatory discussion is offered. An index lists references to products examined by the Council but not included in *Accepted Dental Remedies*. The book is well indexed for quick reference, and is easy to read.

The color of the cover facilitates identification of the current edition and serves further to emphasize the need for constant revision in order to keep pace with the changing status of dental products.

This work is indispensable to the student of dentistry, whether in dental school or in practice.

BIOCHEMISTRY FOR MEDICAL STUDENTS

By William V. Thorpe. Fifth edition. 528 pages with 41 illustrations. Appendix, bibliography and index. Price $6. Philadelphia, J. B. Lippincott Co., 1952.

As a text for guidance in an introductory course in biochemistry this British book will be useful, as it sets forth with concise clarity the important concepts that have been developed up to quite recently. The author apparently has adopted a conservative attitude toward the inclusion of many of the newer and less firmly established considerations, with the result that portions may seem to be unduly dogmatic. On the other hand, the material presented is divested of controversial acces-

sory information, which may be to the advantage of the casual student.

Physico-chemical principles are given brief but lucid treatment in the early chapters. The book emphasizes the physiologic aspects of biochemistry, and while the intricacies of enzymatic metabolic processes are not usually discussed in great detail, the bibliography furnishes adequate source material for those interested. The book appears to be accurate upon most issues, but not all; for example, the brief remarks concerning dental caries do not always agree with opinions prevalent in this country.

The book may be acceptable for use in some elementary biochemistry courses, but for the more penetrating grasp of the subject which the dental student should have, additional comprehensive texts would be needed.

Sholom Pearlman

PROBLEMS OF AGING. (TRANSACTIONS OF THE FOURTEENTH CONFERENCE, SEPT. 7-8, 1951)

Edited by Nathan W. Shock, M.D. 138 pages. Price $3. New York, Josiah Macy, Jr. Foundation, 1952.

This book is a compilation, in verbatim form, of the Proceedings of the Fourteenth Conference on the Problems of Aging, sponsored by the Macy Foundation, 565 Park Ave., New York. The specific problems of aging considered at the conference were those relating to (1) biology and medicine; (2) sociology, psychology, education and religion; (3) economics, employment and welfare, and (4) medical services, hygiene and housing.

Each of these problems of aging was discussed by authorities and participants. The question-and-answer type of discussion was employed throughout.

This kind of presentation holds the reader's interest as perhaps no other form would do. In this method there is, of course, a certain amount of repetition of thought and of words, but this fault of scientific reporting is more than offset by the interest engendered in the intelligent reader, who realizes the inherent weakness of such a method of reporting and does not expect the verbatim proceedings of a conference to be a finished literary production.

The report of the conference, thus presented, is the next best thing to attendance at the conference itself. The book makes absorbing reading on a subject of wide interest. It should be of especial interest not only to the health professions, but to the general public as well, since the problems of aging have ramifications in practically all professional groups of our society, as well as in society itself.

The book is attractive in format and contains a memorial dedication (with photograph) to the late William deBerniere MacNider, a former general chairman of the conference.

Anderson M. Scruggs

DIE ÖRTLICHE BETÄUBUNG IN DER ZAHNHEILKUNDE, MIT BESONDERER BERUCKSICHTIGUNG DER SCHLEIMHAUT UND LEITUNGSANASTHESIE. (LOCAL ANESTHESIA IN DENTISTRY WITH SPECIAL REFERENCE TO INFILTRATION AND CONDUCTION ANESTHESIA).

By Guido Fischer. Ninth edition, completely revised. 244 pages with 195 illustrations. Index. Leipzig, Germany, Johann Ambrosius Barth Verlag, 1951.

Dr. Fischer's textbook of local anesthesia in the original and its several translations has been considered a milestone of dental literature since the first edition of 1911. It may be credited with the earliest scientific formalization of dental local anesthesia. Its author played a major role in the introduction of local anesthesia to the American profession and his name is wedded to familiar technics and instruments.

This is the first appearance of Guido Fischer's *Local Anaesthesia* since 1933. In an eloquent preface he refers to the restriction of German non-military scientific effort in the succeeding years, and the destruction of all the plates and other materials of his book in the war. Thus the present edition is an entirely new work.

As such, it is a model of dental literature. The material is complete but not verbose. The illustrations are generous and clear, notably in the very fine section on anatomy in local anesthesia. The four sections are devoted in the main to (1) preparation and armamentarium, (2) dangers, indications and reactions, (3) anatomy and (4) technics.

American practitioners will find no radically different agents or technics here, although there is some interesting variance in emphasis. Among the methods employed by Dr. Fischer the most notable is his use of the double-ampule procaine-epinephrine dry salt solution. In this technic two prepared ampules respectively contain the proper amount of distilled

water and dry salts from which a fresh solution is prepared immediately prior to each injection. The solution being fresh, of a relatively high pH and low concentration of anesthetic and vasoconstrictor, the author claims excellent depth of anesthesia together with outstanding tissue compatibility and safety to the patient.

Among other interesting features of this book are his description of Melaesthin solution (Woelma-Eschwege) which contains an agent to suppress the alterations of blood pressure observed with the use of vasoconstrictors and a concise table indicating methods of local anesthesia for each tooth.

This book is no longer, as it once was, a necessary component of a complete library for the American practitioner, for there are now available very excellent domestic texts of local anesthesia. But even today, after more than 40 years, Dr. Fischer's work maintains a preeminent position in its field.

L. I. Shepard

THE GROWTH AND DEVELOPMENT OF THE NEGRO IN DENTISTRY IN THE UNITED STATES

By Clifton Orrin Dummett. 124 pages with 21 tables. Price $5. Chicago, National Dental Association, 1952.

This slender book is an historical event in the publication of dental literature. It is the first book devoted exclusively to the status and achievements of the Negro in American dentistry, and one which will be of deep interest to many readers. Following a preface by Joseph F. Volker, dean of the University of Alabama Dental School, an introduction and six chapters cover the beginnings of dentistry among Negroes and a review of the history of the National Dental Association. They also present valuable information on the Negro in dental education and specialization, statistics on the supply and the distribution of Negro dental personnel, interracial professional practices and attitudes of Negro dentists in a southern city and interprofessional relationships with physicians and nurses. Eight contributors—Mary Lee Brown, Roscoe C. Brown, W. Montague Cobb, Daniel A. Collins, Paul B. Cornely, Rhoda L. Goldstein, Stephen J. Lewis, and Clarence Wright—have ably assisted the editor in this task.

For at least 200 years Negroes have practiced dentistry or some phase of it in this country. As early as 1740 a man named Simon is recorded as being able to "bleed and draw teeth." In 1851 Dr. John S. Rock, practicing in Philadelphia, attracted wide attention for his technical ability when he won a silver medal for making artificial teeth; examples of his work were placed on exhibition by the Benjamin Franklin Institute. In 1867 Dr. Robert Tanner Freeman was graduated from Harvard University, the first of his race to receive in America a dental school education and a dental degree. Since that time many Negro men and women have attained prominence in dentistry and have amply demonstrated the ability of the Negro to practice dentistry of the highest order.

In spite of individual attainments, the growth and development of the Negro in dentistry in the United States has been a slow and uphill process. The book carefully points out that this progress has been possible through the assistance of the majority group. It likewise treats forthrightly and without rancor the problems which have faced the Negro in the past—and still exist—in getting a dental education, in developing his professional life and organizations, in regulating his professional and interracial relations and in caring adequately for the dental health needs of Negroes. None of these problems has been completely solved. Indeed, the problems of professional education and the dental health needs of the Negro population are acute. In 1940 the proportion of Negro dentists to the Negro population was 1 to 8,745, a ratio not unlike that for the total population of this country in 1850. The author concludes that the correction of this grave situation is not the responsibility of the Negro alone, but that it concerns the whole nation. For the Negro dentist he asserts "Opportunity on the basis of qualification, professional service based upon scientific competence, cooperation with dignity and without paternalism—these are, and remain, the desired goals."

Donald Washburn

Current Literature

JOURNAL OF DENTAL RESEARCH
December 1952

A TRACER STUDY OF THE TRANSFER OF F^{18} TO TEETH BY TOPICAL APPLICATION

Howard M. Myers, Joseph G. Hamilton and Hermann Becks, p. 743.

Radiochemical data on F^{18} indicate that only 2 per cent of the fluoride ions on the cotton pledget are transferred to the tooth by topical application. Ninety per cent of the amount of F^{18} transferred to the tooth is readily removed by a superficial rinsing. The 10 per cent which remains on the tooth is confined to areas of discolored or carious enamel; the portion readily removed is located on the sound enamel.

THE EFFECT OF SODIUM FLUORIDE UPON THE SURFACE STRUCTURE OF POWDERED DENTAL ENAMEL

Robert B. Fischer and Joseph Charles Muhler, p. 751.

Electron diffraction and roentgen-ray diffraction experiments show that the treatment of powdered dental enamel surfaces with sodium fluoride solution results in a direct transformation from an apatite to a calcium fluoride structure. The rate of this transformation is increased as the pH of the solution is lowered. The concentration of the fluoride solution and the time of treatment also are factors involved in the rate of the transformation.

RELATIONSHIP BETWEEN pH, AGE, AND CONCENTRATION OF SOLUTIONS OF STANNOUS FLUORIDE AND SODIUM FLUORIDE IN DECREASING ENAMEL SOLUBILITY AND AFFECTING THE UPTAKE OF FLUORINE

Joseph C. Muhler, Harry G. Day and William H. Nebergall, p. 756.

The effectiveness of freshly prepared stannous fluoride solutions in reducing the solubility of powdered dental enamel decreases over a period of a few days, but the effectiveness of sodium fluoride solutions does not decrease. Enamel takes up larger amounts of fluorine from stannous fluoride regardless of the age of the solutions, and the uptake is greater from old stannous fluoride solutions than from those which are freshly prepared. The uptake of fluorine from sodium fluoride is not affected by age. These changes appear to be related to the pH of the solutions. The pH of the stannous compound decreases through hydrolysis of the salt, but the pH of sodium salt remains unchanged. Aged dilute solutions are decidedly less effective than freshly prepared solutions in reducing the solubility of dental enamel.

THE FORMATION OF HYDROXYFLUORAPATITE IN TOOTH ENAMEL UNDER INFLUENCE OF DRINKING WATER CONTAINING FLUORIDE

Werner Rathje, p. 761.

In experiments on the production of pure isomorphous hydroxyfluorapatite (= HFA) by acidimetric precipitation from a watery solution, the solubility of hydroxyfluorapatite was determined. It was found that the solubility of hydroxyfluorapatite is considerably diminished even by a small fluorine content. There is some support for the assumption that hydroxyfluorapatite may originate in the enamel by way of drinking water containing fluoride and that the enamel may thus become less soluble and therefore be more resistant to dental caries.

THE EFFECTS OF UREA AND SALTS OF AMMONIUM PHOSPHATE ON SALIVARY AMYLASE

Leon H. Schneyer, p. 767.

Urea in concentrations up to 1.45 M. (8.7 per cent) is without inhibitory effect on salivary amylase *in vitro* under conditions which do not themselves lead to inactivation of the enzyme. Under conditions which lead to progressive, apparently irreversible inactivation of the amylase, urea promotes this inactivation and thereby causes an inhibition of amylase activity. Such inhibition occurs during prolonged contact between enzyme and urea at 37°C. in the absence of alkali metal or ammonium salts and during short periods of contact between urea and amylase at temperatures above the optimum for amylase activity even in the presence of antidenaturant salts. Urea appears to have no effect on reversibly denatured amylase as judged by the absence of inhibition at 39°C. with salts present and by the inability of high hydrostatic pressure to reverse the inhibition by urea at 50°C.

The results of this investigation indicate that

urea would be without effect on amylase *in vivo* in concentrations resulting from the use of ammoniated dentifrices even under conditions of frequent or prolonged use.

THE EFFECTIVENESS OF AN AMMONIUM ION TOOTH POWDER IN THE CONTROL OF DENTAL CARIES. II. COMPOSITION OF DENTIFRICES USED IN THE EXPERIMENT

G. N. Davies and R. M. King, p. 775.

THE ACCESSIBILITY OF THE ORGANIC DENTINAL MATRIX

George W. Burnett and Henry W. Scherp, p. 776.

DENTINAL PROTEIN: AMINO ACID COMPOSITION

W. C. Hess, C. Lee and B. A. Neidig, p. 791.

Twenty amino acids have been determined in dentinal protein obtained from normal human molars, accounting for 98.8 per cent of the total nitrogen. From the concentrations found of these amino acids it can be concluded that dentinal protein is a collagen.

THE ISOLATION OF CHONDROITIN SULFURIC ACID FROM DENTIN

W. C. Hess and C. Lee, p. 793.

Chondroitin sulfuric acid was isolated as its potassium salt from normal human dentin by the method applied to cartilage by Einbinder and Schubert with a yield of 0.64 per cent. Hexosamine and hexuronic acid determinations on intact dentin gave a value of approximately 0.3 per cent. The analytical procedures for these compounds, however, give low results due to destruction by acid hydrolysis in the presence of large amounts of inorganic salts. The presence of galactosamine in the chondroitin sulfuric acid was shown by means of paper chromatography; its similarity to chondroitin isolated from cartilage is thus indicated.

EXPERIMENTAL DENTAL CARIES. I. THE EFFECT OF ORCHIECTOMY AND OVARIECTOMY ON DENTAL CARIES IN IMMATURE RATS

Joseph C. Muhler and William G. Shafer, p. 798.

This study was designed to investigate whether the caries scores of castrated males would be similar to the scores of uncastrated females and the scores of castrated females to those of uncastrated males and to determine further whether the degree of caries would return to its usual pattern in castrated animals with the administration of male or female sex hormones. The result of this investigation showed that the incidence of decay in immature orchiectomized rats was significantly less than in the control males, while ovariectomized rats showed an increased amount of caries. The administration of testosterone to the control males appeared to increase decay, while the same hormone appeared to reduce decay in gonadectomized males as compared to control rats. The administration of diethylstilbestrol to control females appeared to reduce the incidence of decay, while similar treatment of ovariectomized animals significantly increased decay as compared to control animals. Pigmentations of the skin and failure of hair growth on previously shaven areas were observed in castrated males and females receiving their respective hormones.

THE EFFECT OF VITAMIN E DEFICIENCY ON THE RAT INCISOR

J. J. Pindborg, p. 805.

THE REPARATIVE EFFECT OF ANTABUSE (TETRAETHYLTHIURAM DISULFIDE) UPON DENTAL CHANGES IN VITAMIN E DEFICIENT RATS

J. J. Pindborg, p. 812.

The present study is based on the anatomical and histological examination of 20 rats. One month old rats were kept on vitamin E deficient diet for a period of three months. Ten of the rats then received 0.025 per cent Antabuse in addition to the experimental diet for a period of four months, while the other ten were continued on the experimental diet alone. The rats receiving the vitamin E deficient diet showed lack of pigmentation and typical histologic changes in the enamel organ. Rats receiving Antabuse added to vitamin E deficient diet did not show any changes in the incisors.

SYMPTOMS OF VITAMIN A AND E DEFICIENCIES IN THE INCISOR OF THE RAT FED SODIUM SULFITE

J. T. Irving, J. J. Pindborg, O. G. Fitzhugh, J. P. Weinmann and I. Schour, p. 815.

This investigation is based on the gross and histological study of the upper incisors of 43 rats which were fed a diet containing 0.0125

to 2 per cent of sulfite over a period of one to two years. The changes in the incisors consisted of loss of enamel pigment, premature atrophy and edema of enamel organ, folding of dentinoenamel junction, atrophy of odontoblasts, retardation of dentin formation, thickening of fundic bone and keratinization of the epithelium lining of the nasolacrimal duct. These changes are characteristic for both vitamin A and vitamin E deficiencies.

FURTHER STUDIES OF A DIFFERENTIAL CULTURE TECHNIQUE FOR ESTIMATIONS OF ACIDOGENIC BACTERIA IN SALIVA. I. COMPARISON WITH CONVENTIONAL TECHNIQUES AND CONCURRENT CLINICAL EXAMINATIONS

Dorothy R. Rizzo and Evelyn B. Tilden, p. 825.

The authors made use of a quantitative "acidogenic count" which permitted differentiation of lactobacilli from streptococci without suppression of the latter and thus made possible estimations of the numbers of both bacteria in salivas from a group of institutionalized children. Repeated counts over a two year period were compared with tomato agar counts and Snyder tests as well as with observations in concurrent clinical examinations. The results emphasized once more the notable coincidence between high counts of salivary lactobacilli and progressive dental caries. The streptococcus counts failed to reveal any parallelism between carious conditions and the counts of these bacteria, which appeared to reside in the mouths of all children and to proliferate in enormous numbers.

FURTHER STUDIES OF A DIFFERENTIAL CULTURE TECHNIQUE FOR ESTIMATIONS OF ACIDOGENIC BACTERIA IN SALIVA. II. SPECIES OF LACTOBACILLI ISOLATED FROM SALIVA AND THEIR DISTRIBUTION IN A GROUP OF CHILDREN

Evelyn B. Tilden and Muriel Svec, p. 831.

The predominant species of lactobacillus in the saliva of children was the strongly acidogenic *Lactobacillus casei*, which was present alone or with other species in 40 of 45 children with high lactobacillus counts. *Lactobacillus acidophilus* was isolated from 4 and *Lactobacillus plantarum* from 9 of the children. Gas-producing lactobacilli were present in over 50 per cent of the group, *Lactobacillus fermenti* being the most frequent of these (isolated from 20 children). *Lactobacillus buchneri* and *Lactobacillus brevis* were found occasionally. The distribution of the various species was probably not particularly characteristic of children; a similar distribution was found in a group of teen-aged girls studied for one year. The methods used for identifications of species were those employed by Tittsler, Geib and Rogosa. The nutritional requirements of *L. casei* and *L. fermenti* corresponded with those found by earlier workers. The strains of *L. acidophilus* isolated were weakly acidogenic, as were also 11 strains obtained from the American Type Culture Collection; they produced no appreciable change of the indicator in Snyder's test. The gas-producing lactobacilli, on the other hand, were moderately acidogenic, though the change in the Snyder indicator was not always complete in 48 hours. Readings of Snyder's tests probably have some connection with the acidogenic properties of the gas-producing lactobacilli which, though less marked than those of *L. casei*, may well be significant.

DENTAL CARIES EXPERIENCE IN PRIMARY TEETH

John T. Fulton, p. 839.

Dental examinations of 3,009 Illinois children, aged 1 month to 71 months, furnished data for the first part of a curve representing dental caries experience in deciduous teeth through a full cycle from eruption to exfoliation. Data from periodic dental examinations of 233 Cleveland school children, through the age ranges of 60 months to 156 months, are the basis for the second part of the curve. The examination findings on each of the 20 tooth spaces for all children were classified as follows: sound, decayed, missing and indicated for extraction, filled, and total dental caries experience. Although there are differences in attack rates between the two groups of children, the general pattern of the curves for dental caries experience is consistent. The data suggest that dental caries attack in deciduous teeth follows the pattern found in permanent teeth; that is, attack lags behind eruption but rises as posteruptive tooth age increases. Also evident is the inverse relation between the number of filled teeth and tooth mortality.

DENTAL CARIES EXPERIENCE OF SOME FRESHMEN COLLEGE STUDENTS IN UTAH

Ethelwyn B. Wilcox, Delbert A. Greenwood and Leora S. Galloway, p. 844.

Freshman students at Utah State Agricultural College, Branch Agricultural College and Brigham Young University were given a dental

examination. The students who were born and raised in Utah, 1,135 of the 1,954 students examined, had 9 to 12 per cent more DMF teeth than the students who were born and raised in Idaho or in other states (12.3 and 14.2 DMF teeth for the Utah students as compared with 9.7 to 10.0 and 10.8 to 13.0 for the other groups). These differences were highly significant. Comparisons with results of similar studies in other states show similarities and dissimilarities.

The women had a greater number of DMF teeth, fewer teeth needing to be extracted and fewer open cavities than the men. No one area of the state, as represented by these students, showed a low incidence of caries attack. Differences between the number of DMF teeth and surfaces of the students from four different counties in Utah were highly significant.

DENTAL CARIES EXPERIENCE OF A GROUP OF SCHOOL CHILDREN AT OGDEN, UTAH, WITH AND WITHOUT RHEUMATIC FEVER

Ethelwyn B. Wilcox, Delbert A. Greenwood and Leora S. Galloway, p. 849.

Dental examinations including posterior bitewing roentgenograms were given 264 school children from the Ogden, Utah, area. This group was composed half of normal children and half of children with rheumatic fever. Differences between the two groups of children aged 5 to 9 or 10 to 19 years were not significant for the number of DMF and def teeth, DMF and def surfaces, and cavities of the permanent or deciduous teeth. The 5 to 9 year old boys and girls of the rheumatic fever group had 7.6 and 6.7 def deciduous teeth as compared with 6.7 and 6.9 for the normal boys and girls. The 10 to 19 year old boys and girls of the rheumatic fever group had 9.6 and 10.7 DMF permanent teeth as compared with 11.4 and 11.0 for the normal boys and girls. In this study roentgenographic findings increased the number of detectable carious teeth and tooth surfaces by 10 to 30 per cent.

The caries experience of all the Ogden children was relatively high compared with that of children in other studies.

EXCITABILITY IN TERMS OF TIME OF THE DENTAL NERVOUS ELEMENTS

W. R. Loewenstein and A. Faivovich, p. 854.

FIRST PRINCIPLES OF FOUNDATIONAL CAPACITY IN DENTAL INVESTING TISSUES

Edwin S. Smyd, p. 860.

To study the characteristic movements of teeth in response to torque and the effects of prosthetic structures on such movements, stove bolts were imbedded in masses of Korogel to simulate teeth in investing tissues. Single teeth as well as multiple teeth supporting bridgework can be studied for rotational responses to horizontal forces or eccentric loading. Variables of sizes and lengths of the root portions imbedded in the investing material can be kept at laboratory constancy. With simple measuring devices a close quantitative analysis can be reached as to direction and degree of rotation of teeth in response to horizontal forces. Fixation of abutments alters the characteristic simple hinge rotation of the individual teeth and produces larger arcs of rotation. Rotation of a structure with fixed abutments occurs on a center lying in the bone between the abutments. The abutments move up or down, depending on which side of center they happen to be. Mechanical advantage is gained by the larger orbit of rotation. Foundational stability varies directly as the radius varies and is dependent further on the angle of application of the horizontal force. Geometric analysis of the forces arising from the rotations of the mandible and teeth demonstrates that fixation of abutments increases the foundational capacity of the investing tissues and is highly desirable.

MUSICAL THERAPEUTICS

Harold G. Green, p. 871.

The modern concept of psychosomatics is dynamic; there is a constant search for different methods of treatment. Of particular importance is the awareness of the "whole person" as an integrated functioning unit. Since most patients approach dental treatment of all types with apprehension, a survey was made to test the efficacy of music in alleviating the "anticipation syndrome."

It was found that approximately 52 per cent of the patients interviewed admitted apprehension before treatment. When music was used, the majority were benefited or had their attention diverted sufficiently to feel that they were helped.

Deaths

Banks, Clarence H., Franklinton, N. C.; Dental Department, University College of Medicine, Richmond, 1904; died October 29; aged 75.

Baum, Louis, Brooklyn; New York College of Dentistry, 1905; died December 6; aged 66.

Bean, Ray, Long Beach, Calif.; College of Dentistry, University of Southern California, 1908; died December 28; aged 67.

Bell, Benton E., Brownwood, Texas; Louisville College of Dentistry of Centre College, 1905; died December 2; aged 69.

Bettschen, William F., Faribault, Minn.; College of Dentistry, University of Minnesota, 1902; died November 18; aged 75.

Blakeley, Chester C., Chicago; Dental School, Northwestern University, 1916; died December 19; aged 60.

Blalock, Lucian F., Miami, Fla.; Southern Dental College, Atlanta, 1904; died October 18; aged 71.

Bollwerk, Emil H., St. Louis; School of Dentistry, St. Louis University, 1927; died December 17; aged 47.

Bolton, Jacob C., Lancaster, Pa.; Medico-Chirurgical College of Philadelphia, 1911; died November 18; aged 71.

Boyd, William W., Colorado Springs, Colo.; Louisville College of Dentistry of Centre College, 1908; died November 24; aged 69.

Brown, Eulie N., Statesboro, Ga.; Atlanta-Southern Dental College, 1912; died in December; aged 59.

Bushspies, Frederick P., Lake Worth, Fla.; American College of Dental Surgery, Chicago, 1895; died October 30; aged 90.

Cain, Henry O., Canton, Ohio; Cincinnati College of Dental Surgery, 1900; died September 3; aged 80.

Chapman, Harold P., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died January 14; aged 62.

Collins, James E., Lisbon, N. H.; Pennsylvania College of Dental Surgery, 1899; died August 13; aged 80.

Connor, John D., Honesdale, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1923; died October 16.

Cook, Harry H., Monett, Mo.; Western Dental College, Kansas City, 1911; died November 27; aged 64.

Cook, Myron S., Stanwood, Wash.; Chicago College of Dental Surgery, Loyola University, 1903; died September 6; aged 72.

Couch, Mefford J., Chicago; Dental School, Northwestern University, 1914; died January 17; aged 65.

Couples, Ira T., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1920; died December 22; aged 56.

Curry, Samuel S., Manatee, Fla.; Indiana Dental College, 1895; died November 19; aged 84.

Dahlberg, Edward W., Chicago; Chicago College of Dental Surgery, Loyola University, 1915; died January 4; aged 61.

Danforth, Harland A., Lynn, Mass.; died December 28; aged 80.

Dewey, Walter M., Miami, Fla.; Dental School, Northwestern University, 1921; died December 6; aged 62.

Dill, Matthew T., Biglerville, Pa.; School of Dentistry, University of Pennsylvania, 1899; died December 2; aged 77.

Dismukes, James T., Mayfield, Ky.; School of Dentistry, Vanderbilt University, 1897; died December 16; aged 82.

Dodge, Leo S., Wayland, N. Y.; School of Dentistry, University of Buffalo, 1915; died December 7; aged 61.

Dodson, Leonard H., Mayfield, Ky.; Louisville College of Dentistry of Centre College, 1905; died November 25; aged 70.

Donohoe, Margaret, Westport, Conn.; School of Dentistry, Temple University, 1902; died October 4; aged 72.

Duffy, Charley C., Petersburg, Neb.; College of Dentistry, Creighton University, 1909; died November 20; aged 69.

Eader, Thomas S., Frederick, Md.; Baltimore College of Dental Surgery, 1882; died December 14; aged 92.

Eisenstaedt, Joseph, Chicago; Dental School, Northwestern University, 1906; died December 19; aged 67.

Ferree, William E., Bedford, Pa.; Baltimore College of Dental Surgery, 1900; died December 11; aged 84.

Finch, Richard A., Mobile, Ala.; School of Dentistry, Loyola University, New Orleans, 1921; died October 17.

Fisch, Louis, New York; College of Dental and Oral Surgery, New York, 1917; died November 4; aged 56.

Fishell, Elkan W., Chicago; Dental School, Northwestern University, 1897; died October 26; aged 80.

Forgays, Raymond G., Lowell, Mass.; School of Dentistry, University of Louisville, 1917; died December 11.

Garwitt, Mark, New York; College of Dental and Oral Surgery, New York, 1914; died November 22.

Gill, Warren D., Laguna Beach, Calif.; Kansas City Dental College, 1909; died November 26.

Gormley, Frank P., Newport, R. I.; Baltimore College of Dental Surgery, University of Maryland, 1898; died November 24; aged 77.

Gowland, William G., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1895; died November 2; aged 79.

Gross, Arthur, Chicago; Chicago College of Dental Surgery, Loyola University, 1903; died January 2; aged 77.

Gruenberg, Eugene, New York; College of Dentistry, New York University, 1934; died December 3; aged 47.

Hartley, Harry, Havertown, Pa.; School of Dentistry, University of Pennsylvania, 1911; died December 3; aged 67.

Hecht, Joseph A., New York; College of Dentistry, New York University, 1926; died December 22; aged 50.

Helzberg, Henry M., Kansas City, Mo.; Kansas City Dental College, 1914; died December 11; aged 60.

Hinman, Samuel M., Cranford, N. J.; New York College of Dentistry, 1907; died January 6; aged 70.

Hirsch, Samuel, New York; College of Dentistry, New York University, 1930; died December 12; aged 45.

Rowan, Maynard A., Yoakum, Texas; died September 27.

Smith, Carl C., McRae, Ga.; Atlanta Dental College, 1912; died October 28.

Spaet, Emanuel, Brooklyn; New York College of Dentistry, 1921; died August 21; aged 52.

Spratt, Roger L., Lexington, Ky.; Louisville College of Dentistry of Centre College, 1903; died September 19; aged 76.

Stacey, James H., McKenzie, Ala.; Atlanta-Southern Dental College, 1912; died June 27; aged 64.

Stafford, John A., New York; School of Dentistry, University of Pennsylvania, 1899; died November 1; aged 74.

Stevenson, George H., Atlanta, Ga.; Atlanta Dental College, 1909; died September 6; aged 75.

Stowers, Nathaniel, Andover, Mass.; Dental School, Harvard University, 1920; died November 14; aged 53.

Swaney, Walter B., Milwaukee; Dental Department, Milwaukee Medical College, 1901; died September 21; aged 79.

Switzer, Marvin D., Harrisonburg, Va.; Baltimore College of Dental Surgery, University of Maryland, 1902; died October 14; aged 75.

Taft, Walter L., Hartford, Conn.; College of Dentistry, University of Illinois, 1910; died October 22; aged 69.

Talbot, William O., Fort Worth, Texas; Dental School, Northwestern University, 1894; died October 14; aged 79.

Temple, Edward T., Cambridge, Mass.; died November 6; aged 68.

Templeton, William R., Gibson City, Ill.; School of Dentistry, St. Louis University, 1929; died August 26; aged 46.

Terry, Luther G., Philadelphia; Pennsylvania College of Dental Surgery, 1889; died September 18; aged 80.

Thomas, Lewis E., Rockford, Ill.; Dental School, Northwestern University, 1902; died September 29; aged 77.

Tortorich, Mike A., Lutcher, La.; School of Dentistry, St. Louis University, 1931; died May 20; aged 48.

Updegraff, Clarence D., New Castle, Pa.; College of Dentistry, Ohio State University, 1946; died October 17; aged 32.

Van Dyke, Alfred N., Philadelphia; Philadelphia Dental College, 1898; died November 30; aged 83.

Wade, Charles L., Springfield, Mo.; Western Dental College, Kansas City, 1919; died October 2; aged 64.

Wagener, James W., Port Neches, Texas; College of Dentistry, Baylor University, 1919; died October 26; aged 56.

Ward, Jesse, Iowa City, Iowa; College of Dentistry, University of Iowa, 1906; died August 13; aged 68.

Watkins, James H., Sherman Oaks, Calif.; College of Dentistry, Baylor University, 1920; died September 9; aged 53.

Weinstein, William, New York College of Dentistry, 1922; died November 23; aged 52.

Whitelaw, Wilkie, Easton, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1896; died October 2; aged 81.

Whiteman, Wilbert J., Birmingham, Mich.; Department of Dental Surgery, Detroit College of Medicine, 1909; died July 31; aged 72.

Wiener, Zachary S., Brooklyn; College of Dentistry, New York University, 1937; died November 17; aged 38.

Williams, George A., Oakland, Calif.; College of Dentistry, University of California, 1924; died October 21; aged 58.

Winston, William, Rome, Ga.; Atlanta Dental College, 1904; died September 26; aged 77.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
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LON W. MORREY, *Editor* JOHN J. HOLLISTER, *Business Manager*

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1954	Cleveland
Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami
Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 9-11	Montgomery	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	July 12-16	Juneau	J. D. Smith	Box 134, Juneau
Arizona	Apr. 23-25	Tucson	E. M. Scott	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 5-8	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 13-15	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	Apr. 20-22	Los Angeles	C. A. Moss	903 Crenshaw Blvd., Los Angeles
Colorado	Oct. 4-7	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	May 20-23	Hartford	E. S. Arnold	47 Linnard Rd., W. Hartford
Delaware	Jan. 13, 1954	Wilmington	J. C. Baker	Mayfair Apts. Sec. C, 1300 Harrison St., Wilmington
District of Columbia			K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 19-22	St. Petersburg	C. T. Brown	602 Citizens Bldg., Tampa 2
Georgia	Oct. 18-21	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	June 24-27	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 28-July 2	Sun Valley	J. F. Julian	206 Rogers Bldg., Idaho Falls
Illinois	May 12-14	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 18-20	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 4-6	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 10-13	Kansas City, Mo.	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 5-7	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	Apr. 29-May 2	New Orleans	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 25-27	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 4-6	Baltimore	E. L. Pessagno, Jr.	19 Medical Arts Bldg., Baltimore 1
Massachusetts	May 3-6	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 20-23	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 22-24, 1954	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	Apr. 26-29	Jackson	H. M. Campbell	102 Professional Bldg., Tupelo
Missouri	May 10-13	Kansas City	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 7-9	Missoula	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 11-13	Lincoln	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	May 4, 5	Las Vegas	J. E. Ahlstrom	1150 Arizona, Boulder City
New Hampshire	June 11-14	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 22-24	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 24-27	Albuquerque	J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15	New York	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 17-20	Pinehurst	B. N. Walker	608 Liberty Life Bldg., Charlotte
North Dakota	May 24-27	Fargo	V. B. Keltgen	517 de Lendrecie Bldg., Fargo
Ohio	Nov. 8-11	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 19-22	Tulsa	D. Robertson	434 N. W. 13th St., Oklahoma City
Oregon	Mar. 1-3, 1954	Portland	H. C. Fixott, Jr.	Medical Dental Bldg., Portland
Panama Canal Zone	Dec. 8	Balboa	C. F. Atkins	U. S. Army Hospital, Fort Clayton
Pennsylvania	May 20-22	Atlantic City, N. J.	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			F. Ordoñez	1558 Ponce de León Ave., Stop 23, Santurce
Rhode Island			N. G. Migliaccio	1467 Westminster St., Providence
South Carolina	June 18-24	Caribbean Cruise	J. R. Owings	7 Medical Court, Grenville
South Dakota	May 17-19	Rapid City	E. W. Elmen	Sioux Falls

State	Date	Place	Secretary	Address
Tennessee	May 11-14	Knoxville	W. L. McCulley	Brown Bldg., Cleveland
Texas	May 10-14	Houston	W. Ogle	3607 Gaston Ave., Dallas
Utah	Apr. 27-29	Salt Lake City	K. L. Dedekind	914 Medical Arts Bldg., Salt Lake City
Vermont	May 17-19	Woodstock	W. J. Reardon	Rutland
Virginia	May 4-6	Roanoke	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	June 18-20	Yakima	F. J. Dingler	1502 Medical-Dental Bldg., Seattle
West Virginia	July 19-22	White Sulphur Springs	A. B. Drake	506 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 6-9	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 21-24	Laramie	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

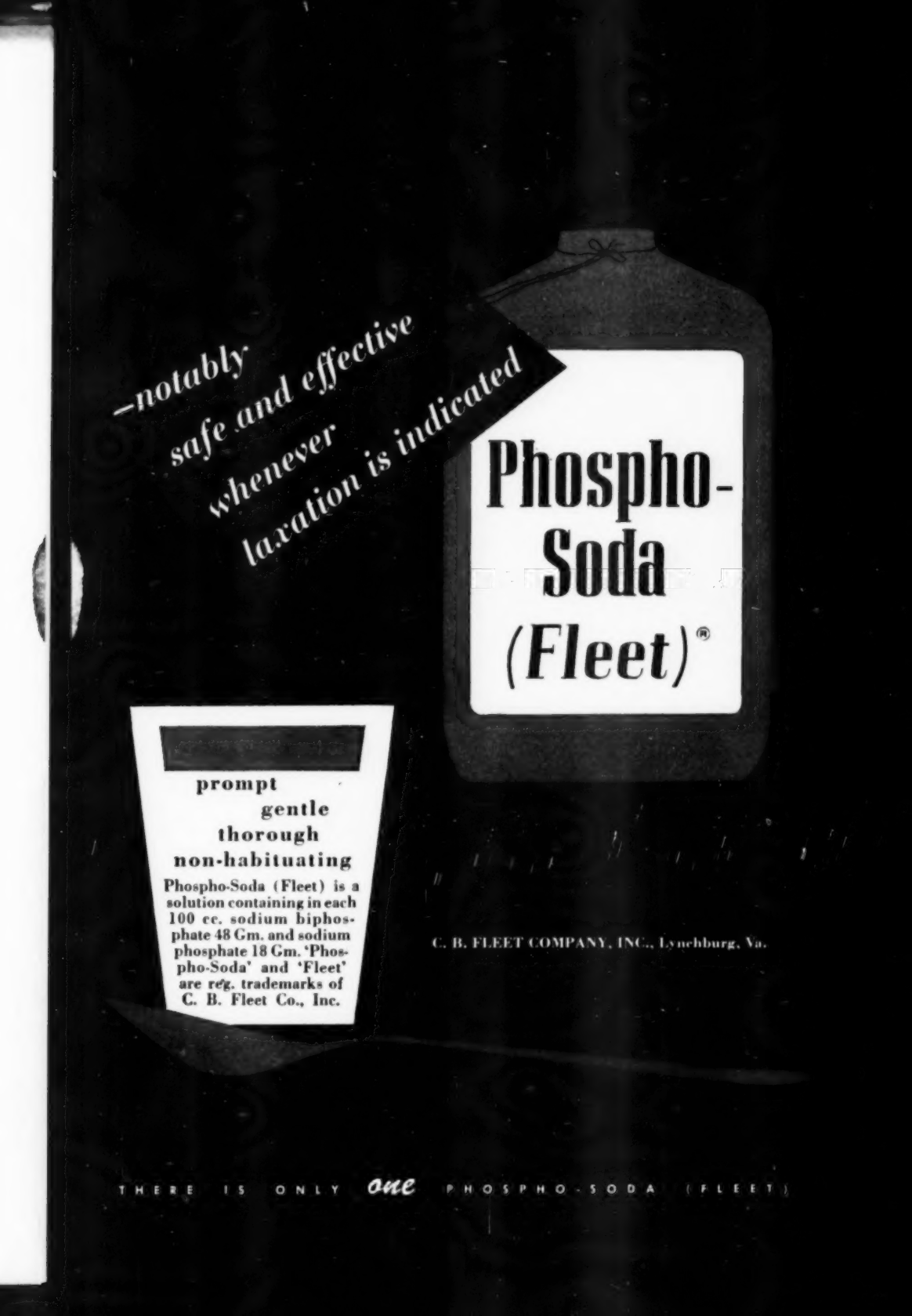
State	Date	Place	Secretary	Address
Alabama	June 15*	Birmingham	N. E. Allen	Du Bose Bldg., Selma
Alaska	July 6-10	Fairbanks	J. H. Geyer	209 Goldstein Bldg., Juneau
Arizona	Aug. 10-15	Florence	R. K. Trueblood	107 East A Ave., Glendale
Arkansas	June 22-26	Little Rock	H. O. Weatherly	205 Halter Bldg., Conway
California	July 27	San Francisco	K. I. Nesbitt	507 Polk St., San Francisco 2
	June 22	Los Angeles		
Colorado	June 22-26	Denver	C. K. Phillips	724 Republic Bldg., Denver 2
Connecticut	June 15-20	Bridgeport	C. G. Brooks	302 State St., New London
Delaware	June 29-July 1	Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia	June 1-5	Washington	W. T. Birthright	1835 Eye St., N. W., Washington 6
Florida	July 6-14*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia	June 8	Atlanta	S. H. Yarbrough	12 Medical Arts Bldg., Columbus
Hawaii	Aug. 31, Sept. 1, 5, 6*	Honolulu	H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho	June 24-26	Boise	W. K. Adams	1624 Arlington, Caldwell
Illinois	June 23-26	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 16-19*	Indianapolis	C. A. Frech	504 Broadway, Gary
Iowa	May 25-29*	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 1-4	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky	June 8-11	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana	June 1-5	New Orleans	R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine	June 22-25	Boston	R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 8-10	Baltimore	H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts	June 15-19†	Boston	R. A. Barrette	Rm. 33 State House, Boston
	June 17-19‡‡			
Michigan	June 7-13	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota	June 15-19	Minneapolis	F. A. Larson	1632 Washington St., N.E., Minneapolis
Mississippi	June 16-18	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri	June 8, 9, 12, 13	St. Louis	R. R. Rhoades	414 Central Trust Bldg., Jefferson City
	June 10-13	Kansas City		
Montana	July 13-16	Helena	V. J. Quinn	301 Phoenix Bldg., Butte
Nebraska	June 8-13	Lincoln	H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada	June 1	Reno	G. C. Steinmiller	Suite 6, Masonic Temple, P.O. Box 2473, Reno
New Hampshire	June 19, 20	Boston	D. J. Freese	4 Wall St., Concord
New Jersey	June 29, 30**††	Philadelphia	W. A. Wilson	150 E. State St., Trenton 8
	June 17, 18**	New York		
	July 1-3§	Trenton		
New Mexico	June 22-25	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	June 23-26§	New York	D. W. Beier	23 S. Pearl St., Albany 7
		Buffalo		
		Albany		
		Rochester		
		Syracuse		
	June 18, 19**	New York		
		Buffalo		
North Carolina	June 22-26	Chapel Hill	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 13-17	Fargo	A. B. Crabtree	Ellendale
Ohio	June 18-20§‡	Columbus	H. B. Smith	336 E. State St., Columbus
	June 22-24**			
	June 20††			
Oklahoma	June 21-24	Oklahoma City	R. P. Keidel	403 Surety Bldg., Muskogee
Oregon	June 15-18*	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem

State	Date	Place	Secretary	Address
Pennsylvania	June 22-24‡‡	Philadelphia and Pittsburgh	A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
	June 25-27**	Philadelphia		
	June 25††	Philadelphia		
Puerto Rico	Sept.§§	San Juan	L. C. Coll	Box 9156, Santurce
Rhode Island	June 15-17	Providence	F. M. Hackett	267 Academy Ave., Providence
South Carolina	July 1-3	Columbia	T. C. Sparks	1315 Pickens St., Columbia
South Dakota	June 21-24	Sioux Falls	H. T. Aker	Canton
Tennessee	June 15-19	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas	June 14-20†	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
	June 19, 20‡‡			
Utah	June 26-July 3	Salt Lake City	E. O. Thompson	915 Medical Arts Bldg., Salt Lake City
Vermont	June 22-24	Burlington	F. A. Reid	Windsor
Virginia	June 8, 9‡‡	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
	June 8-13†			
Washington	June 22-26*	Seattle	T. D. Schimke	662 Paulsen Medical and Dental Bldg., Spokane
West Virginia	June 22-24*	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 15-19*	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 16	Casper	W. A. Hocker	212 O & S Bldg., Casper

*Dentistry and dental hygiene.
**Dental clinical examinations.
†Dental examinations.
††Hygiene clinical examinations.
§Dental written examinations.
‡‡Hygienists' examinations.
‡Hygiene written examinations.
§§Indicates approximate dates. These dates should be verified with the State Examining Board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 12-19	Los Angeles	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	June 26-28	Washington, D. C.	W. M. Greenlut Secy.	124 E. 84th St., New York
American Academy of Implant Dentures	Sept. 27	Cleveland	P. S. Loechler Secy.	215 Tenth St., S.E., Rochester, Minn.
American Association for Cleft Palate Rehabilitation	Apr. 27, 28	Atlanta, Ga.	J. Matthews Secy.	1617 Cathedral of Learning, University of Pittsburgh, Pittsburgh
American Association of Industrial Dentists	Apr. 21-23	Los Angeles	E. R. Aston Secy.	Dept. of Health, Commonwealth of Pennsylvania, Harrisburg, Pa.
American Association of Orthodontists	Apr. 26-30	Dallas, Texas	F. A. Squires Secy.	Medical Centre, White Plains, N. Y.
American Board of Dental Public Health	Sept. 24, 25	Cleveland	P. E. Blackerby, Jr. Secy.	250 Champion St., Battle Creek, Mich.
American Board of Orthodontics	Apr. 22-26	Dallas, Texas	C. E. Martinek Secy.	661 Fisher Bldg., Detroit 2
American College of Dentists	Sept. 27	Cleveland	O. W. Brandhorst Secy.	4952 Maryland Ave., St. Louis
American Dental Society of Europe	Aug. 4-7	Bergen, Norway	F. D. Derrick Hon. Secy.	140, Park Lane, London W.1, England
Arpa Internationale, Thirteenth Congress	July 13-19	Geneva, Switzerland	J. N. Nally Secy. Gen., Com. on Organization	8, rue de Saussure, Geneva, Switzerland
Berkshire Conference in Periodontology and Oral Pathology	June 14-18	Boston	I. Glickman Dir.	Tufts College Dental School, 136 Harrison Ave., Boston 11
Fédération Dentaire Internationale	July 26-Aug. 1	Oslo, Norway	G. H. Leatherman Hon. Secy.	35 Devonshire Place, London W. 1, England
International Academy of Anesthesiology	May 13	Washington, D. C.	I. G. Tomack Exec. Secy.	355 E. 149th St., New York
National Board of Dental Examiners	Apr. 13, 14		G. J. Casey Secy.	222 E. Superior St., Chicago 11
New England Dental Society	Oct. 21, 22	Boston	F. L. Finley, Jr. Secy.	43 Farmington Ave., Hartford, Conn.
Pacific Coast Society of Prosthodontists	Apr. 18, 19	Santa Monica, Calif.	A. W. Spaulding Secy.	4350 11th Ave., Los Angeles
Thirteenth Australian Dental Congress	June 1-5	Brisbane	A. H. Jackson Secy.	New Zealand Chambers, 334 Queen St., Brisbane, Australia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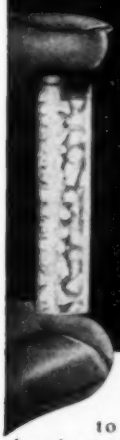

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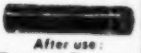

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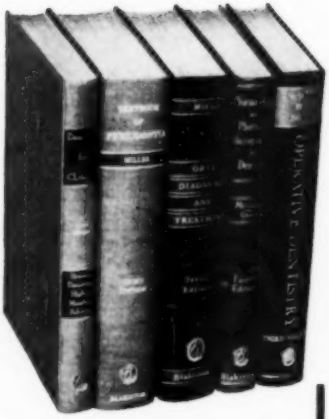

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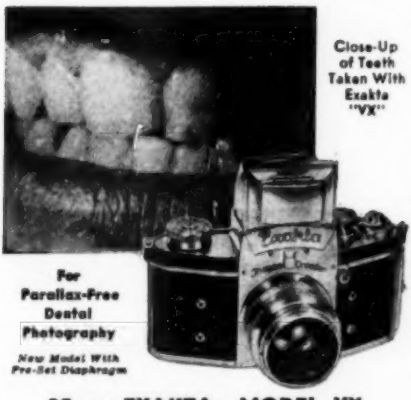

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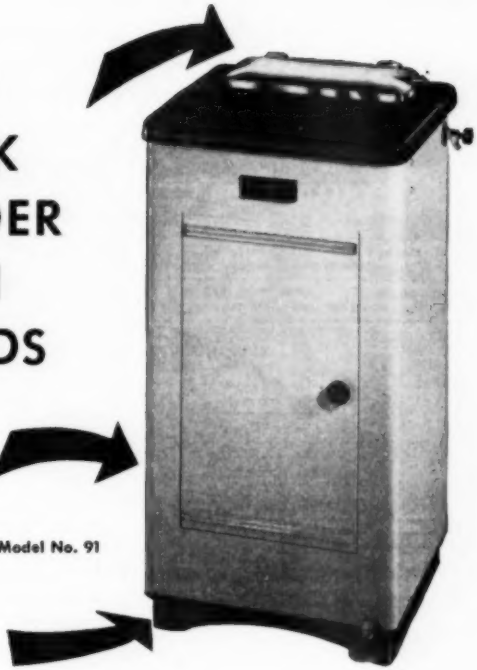

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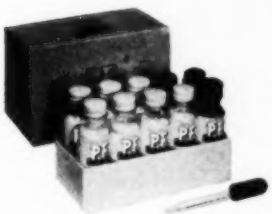

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$200.00	3,000.00	10,000.00	30.15	34.65	43.65
$300.00	3,000.00	15,000.00	44.25	51.00	64.50
$400.00	3,000.00	20,000.00	58.35	67.35	85.35

Premiums will be billed half-yearly.

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If you are not now insured under the ASSOCIATION PLAN, communicate with the Trustee of the Policy Dr. Paul W. Zillmann, 29 Walden Avenue, Buffalo 11, N. Y., or with M. A. Gesner Inc. 150 East Superior St., Chicago 11, Ill.

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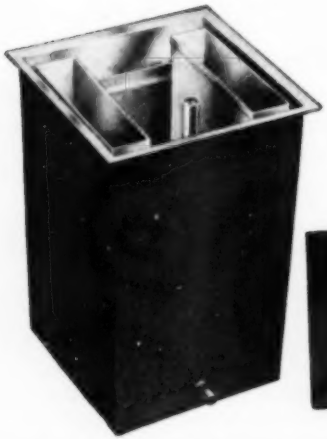

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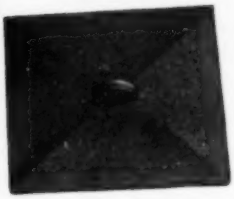

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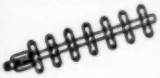

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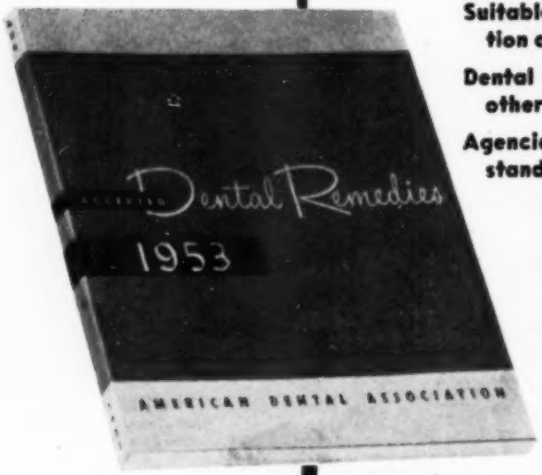

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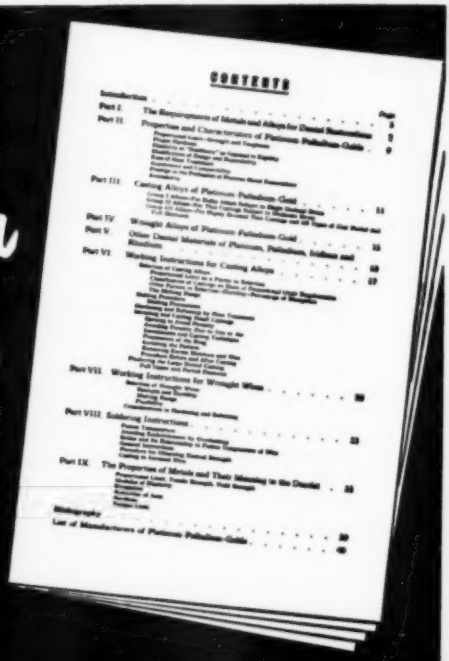

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An Orange a Day

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"Eat an orange a day" is sound advice for your patients.

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No colored paste or tooth brush cleans the 30 spaces '60' contacting sides BETWEEN teeth—where food particles lodge, ferment and decay. Why not instruct your patients to use the FLOSSY?—GUIDES floss safely with 'just a bite'—TWIST—floss comes out DIAGONAL—cleans NECKS of 2 teeth. Until this system of Interdentalaxis is practiced TEETH WILL DECAY. Book "Your Teeth are NEVER Clean Until Cleaned BETWEEN" FREE.

No. 1 50c—No. 2 in Ivory Compact $1.00. 100 day Refill 25c—5 for $1.00—Want Proof? Send dollar bill for asst. postpaid—you too will condemn 'hand use floss' and score FLOSSY 54%—CTS 28% Toothbrush 18%.

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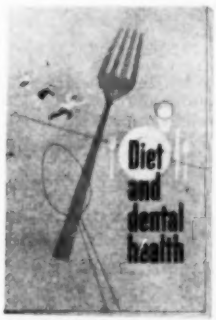

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Be prepared with a supply of "Diet and Dental Health"—a 16-page pamphlet that answers patients' questions in lay language. Authoritatively written, "Diet and Dental Health" contains the latest and best information on a subject in which there is great patient interest. Get a supply today!

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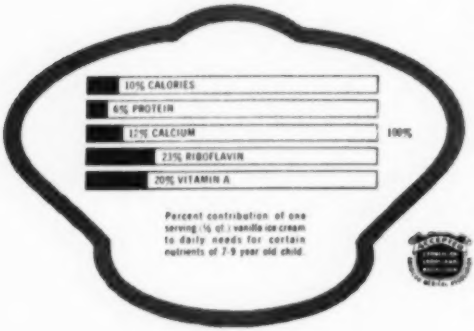
ICE CREAM plays an important role in many children's diets because of its nutrient content and appetite appeal.

For normal growth in children the diet must supply fat, carbohydrate, protein, minerals and vitamins—for energy and for building tissues and maintaining body functions. It has been found that children's appetites can't always be depended upon to provide enough calories for satisfactory growth.[1]

Adequate calories are necessary for both "visible growth," measured by gain in weight, and for "invisible growth," measured by gains in protein.[1] Increasing the energy intake increases efficiency of protein utilization.[2] Both carbohydrate and fat are effective, but fat appears to play a special role in protein utilization and improved growth rates.[2]

A serving of vanilla ice cream supplies, in addition to energy, nearly one-fourth of the day's riboflavin need for a 7 to 9 year old child, one-fifth of the vitamin A, and more than one-tenth of the calcium, as well as some of all the other important milk nutrients.[3]

High nutritive value plus appetite-tempting taste make ice cream a good food for children.


10% CALORIES
6% PROTEIN
12% CALCIUM
100%
23% RIBOFLAVIN
20% VITAMIN A
Percent contribution of one serving (½ qt.) vanilla ice cream to daily needs for certain nutrients of 7-9 year old child.

[1]Macy, I. G. and Hunscher, H. A. Calories—a limiting factor in the growth of children. J. Nutr. *45*:189 (Oct.) 1951.

[2]Geiger, E. Extra caloric function of dietary components in relation to protein utilization. Fed. Proc. *10*:670 (Sept.) 1951.

[3]Dahlberg, A. C. and Loosli, J. K. Nutritive value of commercial ice cream. J. Am. Diet. Assn. *24*:20 (Jan.) 1948.

This seal indicates that all nutrition statements in the advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

Since 1915 . . . the National Dairy Council, a non-profit organization, has been devoted to nutrition research and education to extend the use of dairy products.

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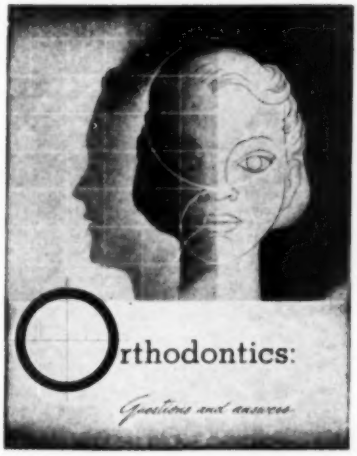

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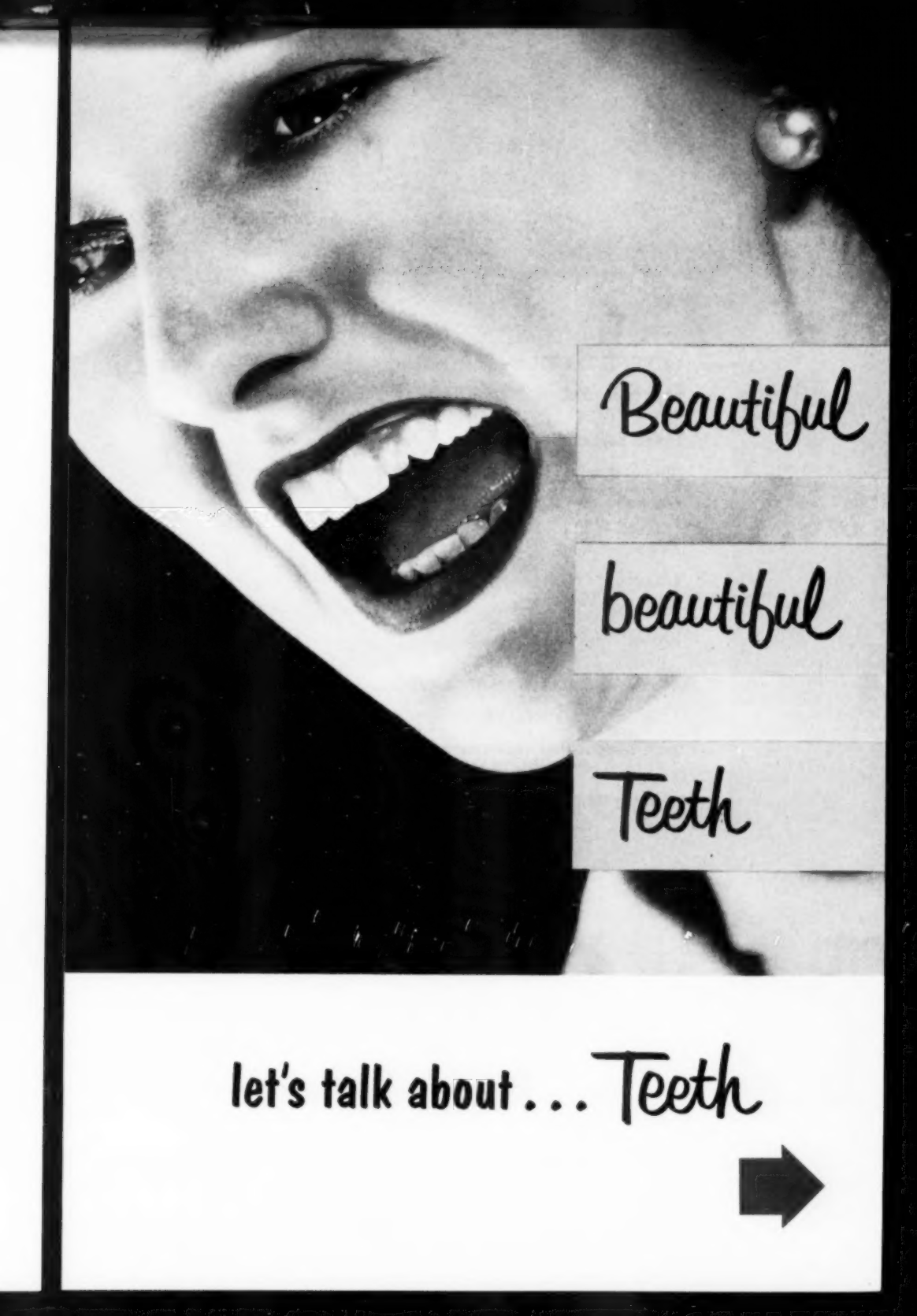
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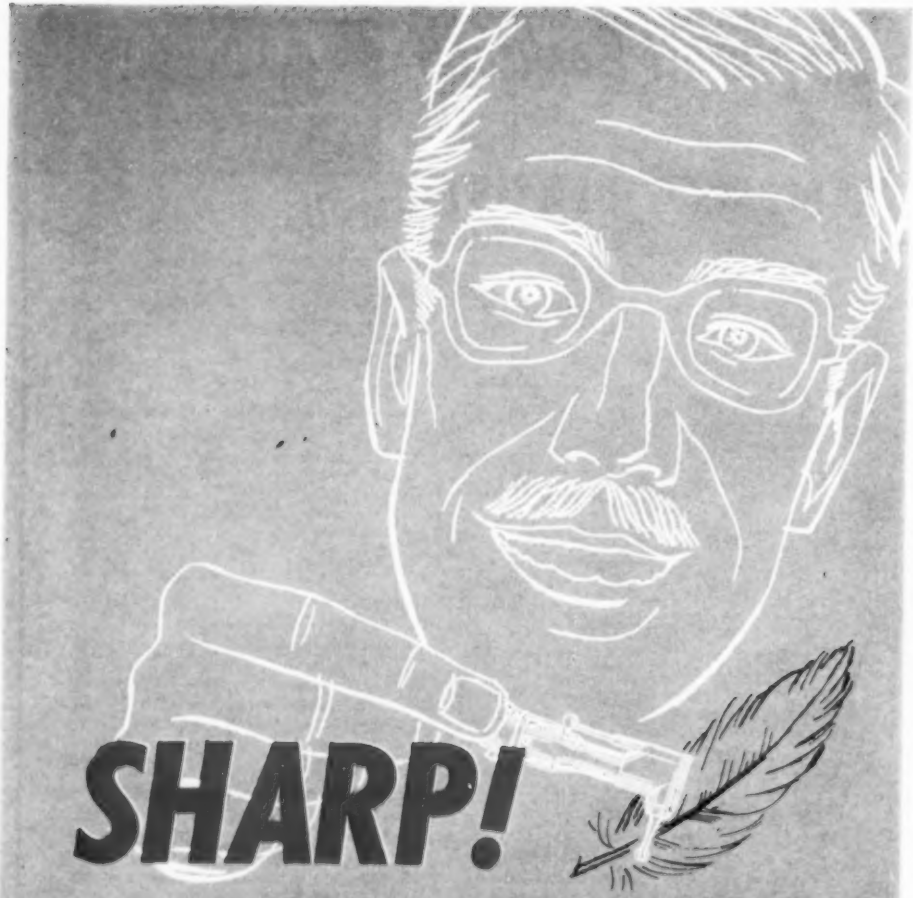

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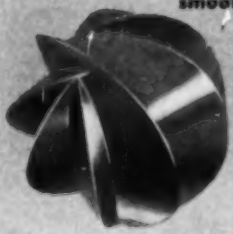

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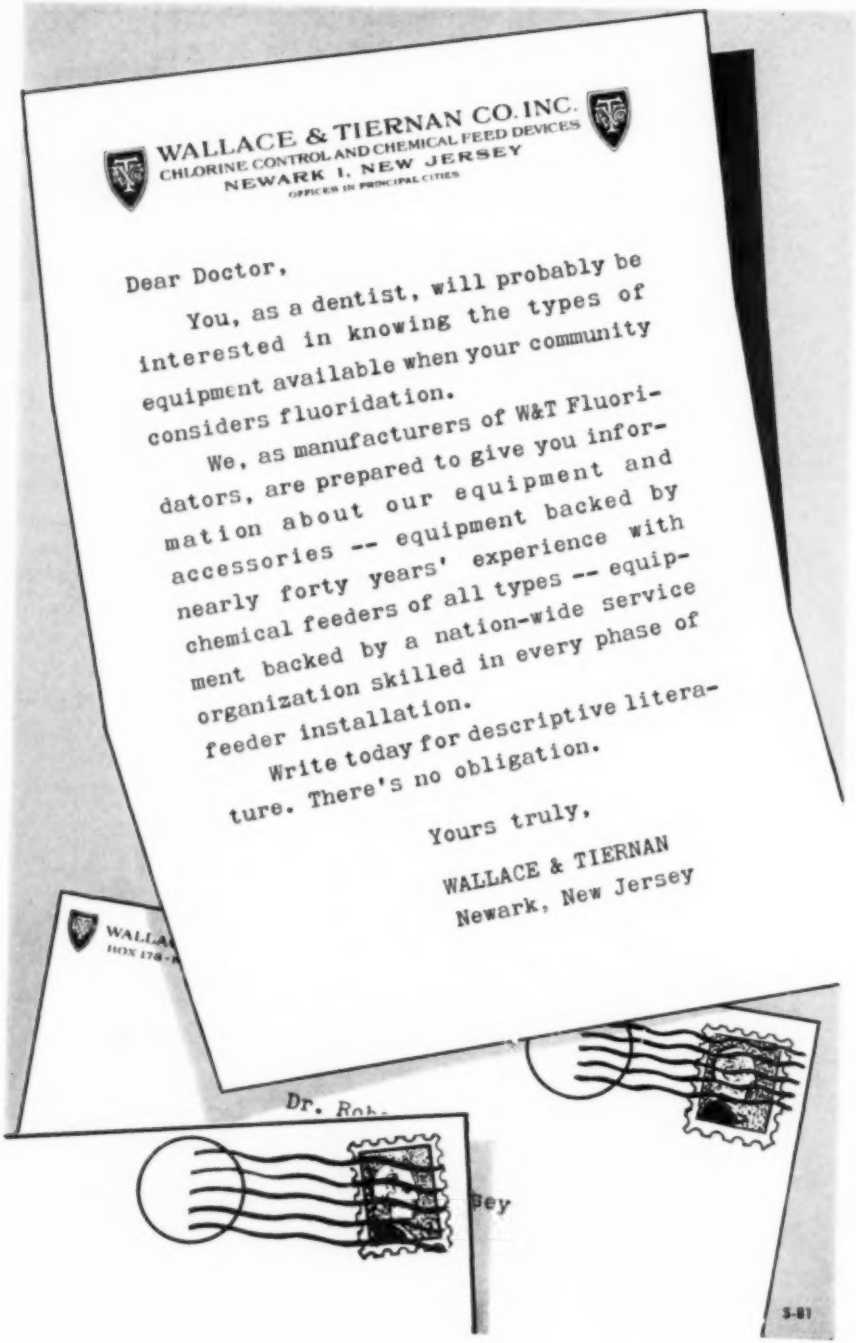

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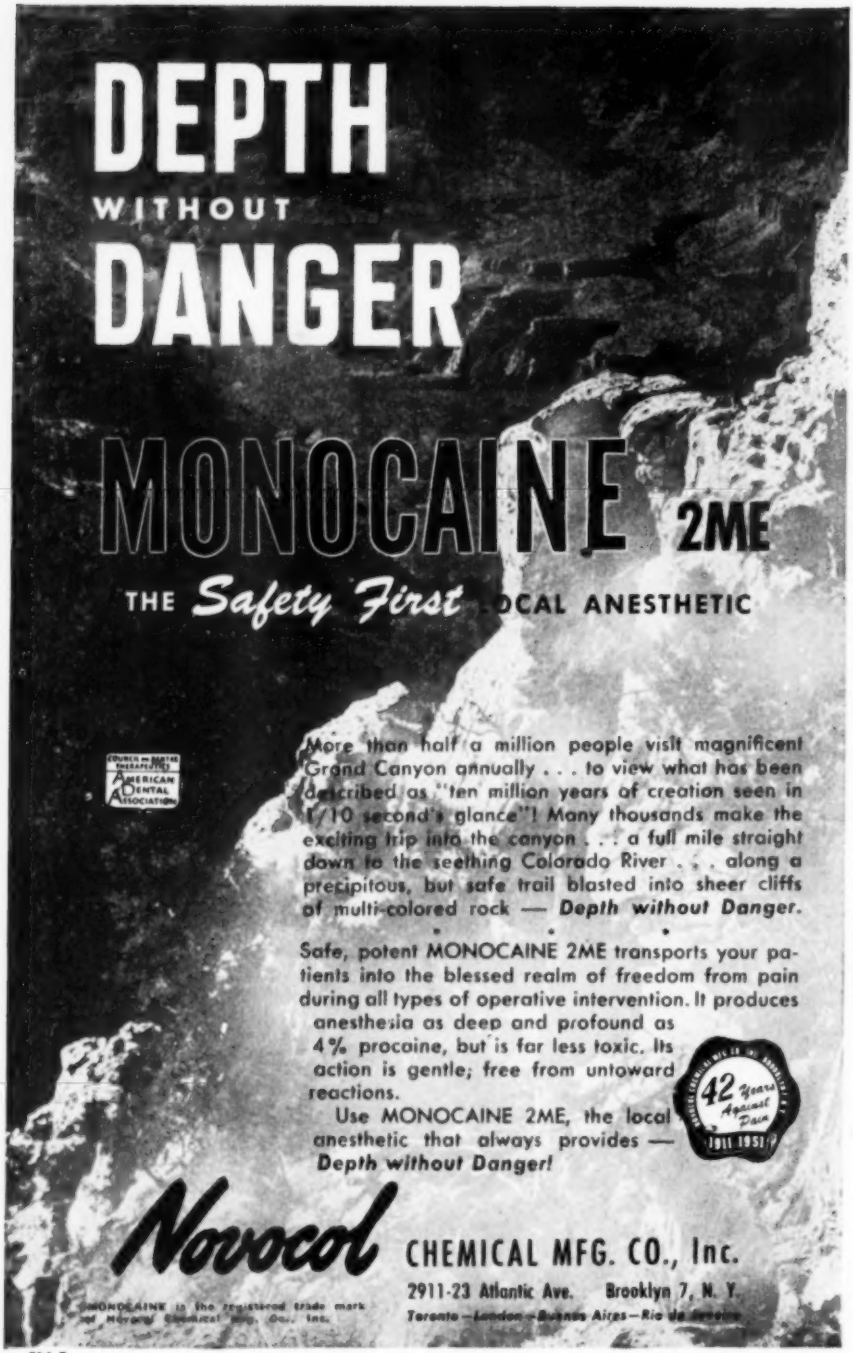
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4	Belmont	3.25- 4.25	5.75- 7.50*
5	Bolton Square	3.50- 5.00	6.50- 8.00
6	Carter	4.50- 8.00	7.00- 12.50
7	Cleveland	5.00- 10.00	8.50- 15.00
8	Commodore	6.50- 10.00	8.50- 12.00
9	Fenway Hall	6.00- 6.50	8.50- 10.00
10	Hollenden	4.50- 8.00	7.00- 16.00
11	Lake Shore	5.00- 8.00	9.00- up
12	New Amsterdam	3.00- 4.00	5.50- 7.00
13	Olmsted	$4.25- $8.00	$7.00- $10.00
14	Park Lane Villa	5.50- 6.00	7.00- 8.00*
15	Quad Hall	3.00- 6.00	6.00- 10.00
16	St. Regis	3.50- 5.00	5.00- 9.00
17	Sovereign	5.00- 7.00	7.00- 9.00
18	Statler	5.50- 9.50	8.50- 16.00
19	Stockbridge	4.00- up	6.00- up *
20	Tudor Arms	5.00- up	8.00- 11.00
21	Wade Park Manor	6.00- 7.00	9.00- 11.00
22	Westlake	6.00	8.00- 9.00

*Suites not available
Rates for suites available on request

Hotel reservation application

94th Annual Session
American Dental
Association
Sept. 28—Oct. 1, 1953
Cleveland, Ohio

INSTRUCTIONS: Reservations for hotel accommodations may be secured by completing this application and mailing it to: A.D.A. Housing Bureau, 511 Terminal Tower, Cleveland 13, Ohio.

Be sure to indicate your arrival time in Cleveland. Reservations will be held only until 6 p.m. of the day you indicate when you will arrive in Cleveland. Failure to notify the hotel of any last minute change in your arrival time may result in cancellation of the reservation.

Names of all persons who intend to occupy the accommodations must be listed on the application.

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Applicant:

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_____ _____ _____ _____
(Street address) (City) (Zone) (State)

Arrival in Cleveland _____ a.m. p.m. Leaving _____

Accommodations:

Hotel _____ Hotel _____
(First choice) (Third choice)

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(Second choice) (Fourth choice)

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☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day. } 2 names must be listed below

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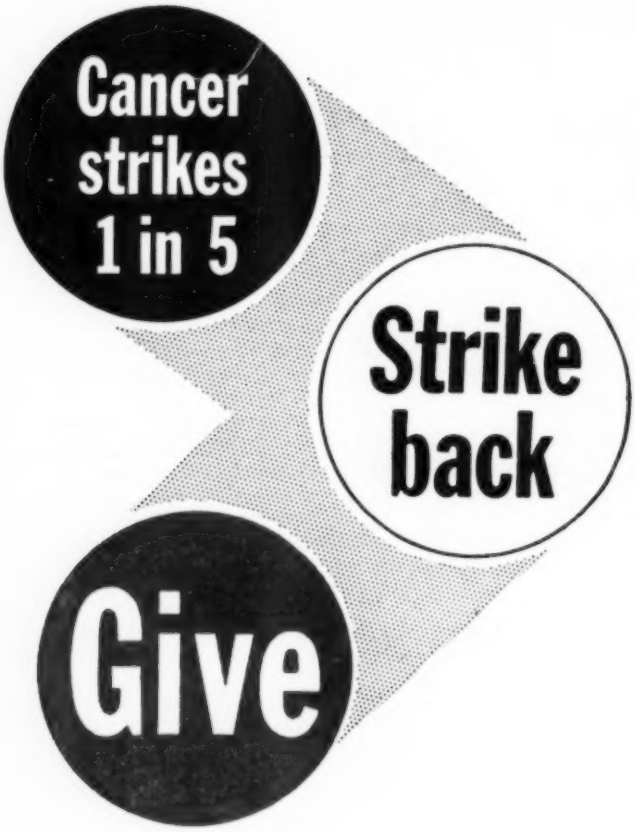
☐ Suite of _____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use an extra page for listing additional names if necessary)

Room will be occupied by:

_____ _____ _____ _____
(Name) (Address) (City) (State)

_____ _____ _____ _____
(Name) (Address) (City) (State)



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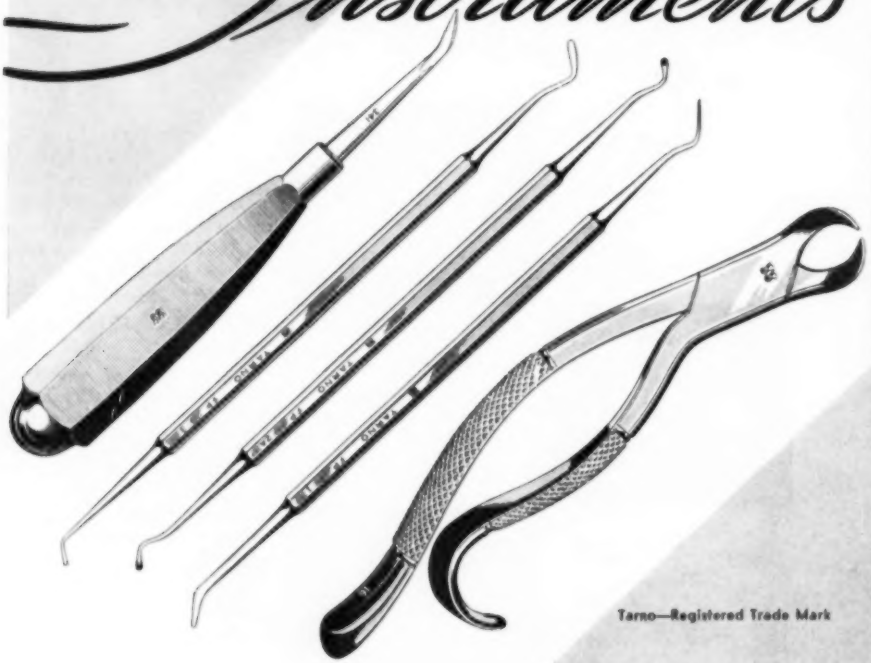

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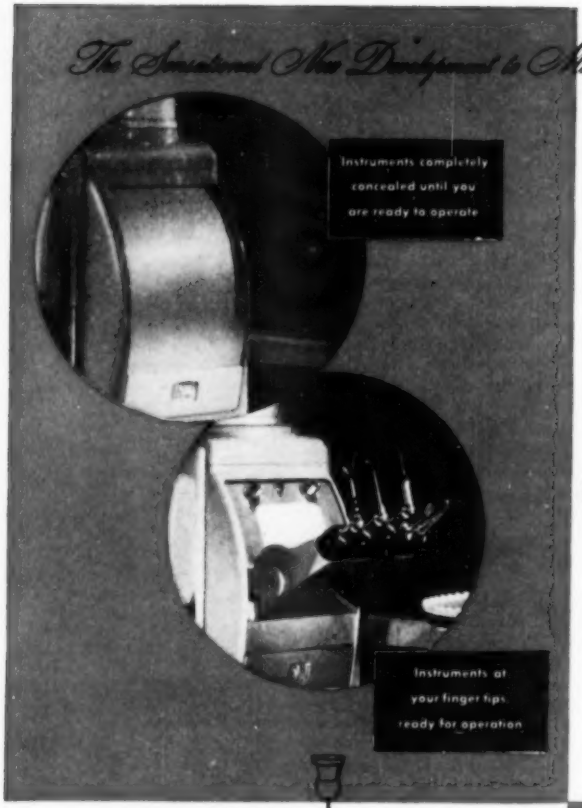

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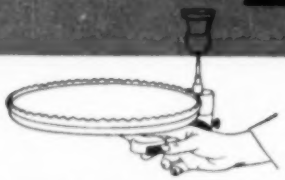

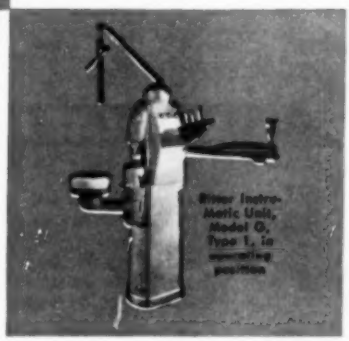

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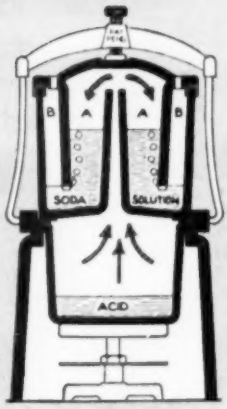

Acid fumes rise through funnel into chamber (A), becoming neutralized as they pass through soda solution into chamber (B) to escape as harmless vapor through openings in cover.

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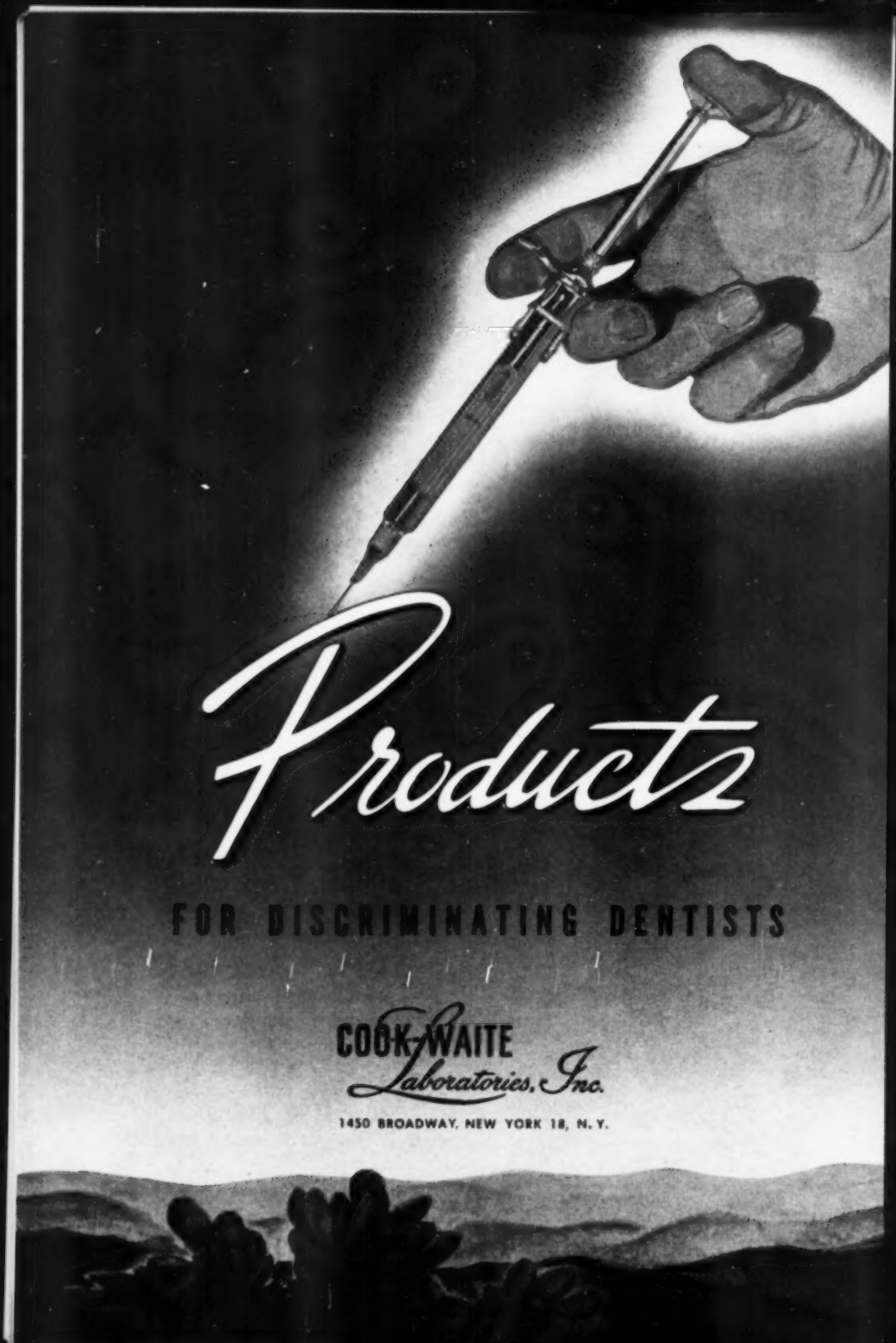
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Other Groups		A		B	B
Streptococcus viridans		A		B	
Staphylococcus	B	A	B	A	B
Pneumococcus	B	A		B	B
C. diphtheriae		A		B	B
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1. KEEFER, C. S., POSTGRAD. MED. 9:101, FEB. 1951 2. FLIPPIN, H. F., AND ISRAEL, H. L., MED. CLIN. NORTH AMER. 36:1053, NOV. 1952

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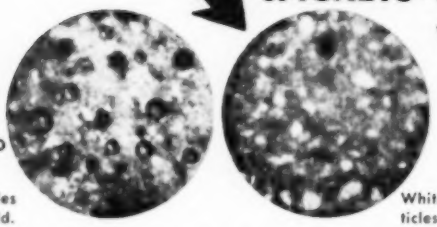

CONVENTIONALLY FIRED PORCELAIN

Large spots are air bubbles which pockmark entire field.

NU-DENT VACUUM FIRED PORCELAIN

White flecks are quartz particles. Note dense structure.

These photomicrographs were made under polarized light at 200X. Reproduced here reduced one-third.

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- **Exquisitely Natural Shading.**
- **Freedom from Pits, Pores and Air Pockets.**

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- **Notably Increased Strength, Hardness, Density.***

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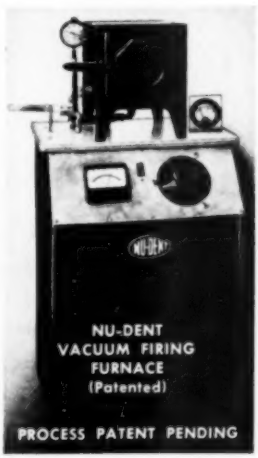
TRY A NU-DENT VACUUM FIRED JACKET — *You Can Even SEE the Difference.*

Write Studio Nearer You for Literature and Price List.



*Report by nationally recognized testing laboratory sent on request. Nu-Dent Vacuum Fired Porcelain is so hard and dense that, if ground, it can be repolished to a high glaze with fine pumice and a felt wheel.

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